

ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

McGraw-Hill Publishing Co., 22 West Maple St.
Chicago 10, Illinois

APRIL 1956

Cost Estimating

(Beginning a Series)

19 Features and Reports
in This Issue

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Accepted as Controlled Circulation
Publication at Cedar Rapids, Iowa

CARBIDE
INSERT?
or
MULTI-USE?

**"Bit cost so low with TIMKEN® multi-use rock bits it's hardly an item"
... says Acme Construction Co.**



LOCATION: By-Pass State and Federal Project, U. S. Route #52, Welch, West Virginia.

OPERATING CONDITIONS: Soft shale to very hard sandstone.

**your best bet
for the best bit
... for every job**

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

FOR precision drilling in mountain-side formations from soft shale to very hard sandstone, Acme Construction Co. of Beckley, W. Va., used only one size of Timken® multi-use bits. With controlled distribution of reconditioned bits, Acme got a bit cost so low they barely consider it an item.

Driller after driller gets similar savings. With correct and controlled reconditioning, Timken multi-use bits give the lowest cost per foot of hole when full increments of steel can be used in ordinary ground.

But they may not be the best answer for *all* your drilling problems.

When you drill in hard, abrasive ground, you get higher speeds and greater economy by switching to Timken carbide insert bits. They're your best bit for extremely deep holes, constant-gauge holes, small diameter blast holes.

Timken multi-use and carbide insert bits are important time-savers when your drillers change bits. They're interchangeable in the same thread series. And dozens of different Timken bits fit the same drill steel. Bits can be changed right on the job.

All Timken bits are made from Timken fine alloy steel and have special shoulder unions to protect the threads from drilling impacts. We're the only removable rock bit manufacturer that makes its own steel. We do it to control quality at every step of the way. To find out which bit will save the most and do the best job for you, call on Timken Rock Bit Engineering Service. Write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Timken threaded
multi-use rock bit



Timken threaded
carbide insert rock bit

Man with 8000 lbs. of bicep!

**hydraulic hammer uses
Chrysler power to
crush costs, speed
construction**

These days the speed with which highways fan out and buildings go up is nothing short of astounding. American inventiveness has met the challenge to cut costs and reduce construction time—one way has been to use dependable high-speed industrial power to better advantage. Consider this mobile hydraulic hammer.

With the Arrow Hydraulic Hammer, one man can apply as much as 8000 ft/lbs of work force to break up old concrete or slice up old asphalt preparatory to resurfacing. He can easily tamp down dirt, gravel or stone to provide a firm foundation or to compact trench backfills. Hydraulic positioner swings the tower and hammer from side to side, forward and backward, permitting the unit to cover the area between the wheels. The operator can adjust work speed from one to twenty feet per minute, eliminating the possibility of overlapping and skipping.

When it's time to pack up and move, the hammer tower folds down and a five-speed transmission sends the vehicle down the highway at speeds up to 27 mph.

Chrysler supplies Arrow Manufacturing Co. with the Chrysler Industrial 30 Engine and heavy-duty 5-speed transmission. This popular 230 cubic inch displacement engine powers hydraulic systems controlling hammer stroke, tower and hammer positioning, and drives the vehicle at "creep" and highway speeds.

You're way ahead with construction equipment that's Chrysler-powered. Whether in-line 6 or V-8, 230 to 413 cubic inch displacement, high-speed Chrysler Industrial Engines have built enviable reputations based upon good solid engineering, precision-manufacture, heavy-duty industrial components.

See a Chrysler Industrial Engine Dealer or write: **Dept. 104, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.**

Chrysler Industrial 30 Engine—230 cubic inch displacement



PHOTO COURTESY ARROW MANUFACTURING COMPANY, DENVER, COLORADO

Chrysler

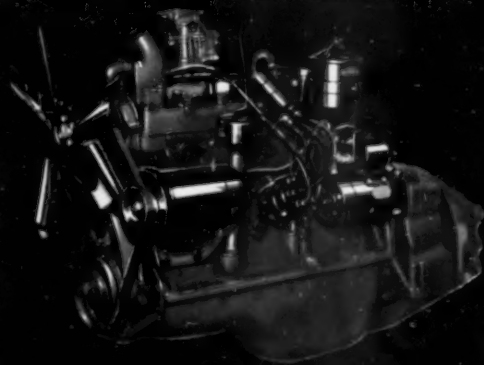
INDUSTRIAL ENGINES



HORSEPOWER WITH A PEDIGREE

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

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Pipe made of Beth-Cu-Loy is easy to install

This is a 48-in. drainage line fabricated of corrugated Beth-Cu-Loy galvanized steel. Workmen are joining a 14-ft length to the rest of the line. You can see how simple and quick this operation is: a band of Beth-Cu-Loy secured around the joint with a few turns of a wrench on the bolts.

No sealing compound needed here, no mortar, no waiting for the joint to set. The laying of the pipe can move as fast as the trenching, and the trenching itself is a less "finicky" job with Beth-Cu-Loy because of steel's strength and flexibility. Light weight of the pipe simplifies laying.

Pipe made of Beth-Cu-Loy conforms to grade and align-

ment without pulling apart. Further, it will flex with the fill to equalize loads around it. It absorbs vibration, impact and the shifting effect of weather changes.

Bethlehem manufactures the Beth-Cu-Loy galvanized corrugated and flat steel stock used by pipe fabricators. If you would like further information about Beth-Cu-Loy, or the names of those who make pipe with it, just get in touch with the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributors:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL



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ROADS AND STREETS

A GILLETTE PUBLICATION

APRIL, 1956

VOLUME 99

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3 GENERATIONS BUILD

WEST COAST CONSTRUCTION EMPIRE



**GOODYEAR
WAS THERE!**



Starting 76 years ago, as a small contractor, Adolph Teichert built the versatile organization that has what it takes to lick the big ones pictured above. Today, when you see a giant West Coast job—quarrying, earth-moving, road, rail bed, military base or dam building—it's a fair bet that A. Teichert & Son, Inc., have a hand in it! Earthmover shown above has Goodyear Hard Rock Rib tires on front wheels, Hard Rock Lug on rear.

Now Goodyear "is there" with 3-T Nylon Cord Tires... TUBELESS or TUBE-TYPE

For well over 2 years, Goodyear Triple-Tempered 3-T NYLON CORD tires have been breaking records for stamina and endurance on the toughest jobs in our land.

And now your savings can be even greater—your tube and flap troubles ended forever—with Goodyear *tubeless* tires for every type vehicle *regardless of size!*

Leading equipment manufacturers have adopted Goodyear tubeless tires as standard—or will supply them as specified. Or you can convert your present equipment to Goodyear tubeless. Get the facts from your Goodyear dealer.

Goodyear, Truck Tire Dept., Akron 16, Ohio

ROAD LUG

HARD ROCK
LUG

HARD ROCK
RIB

ALL-WEATHER

SURE-GRIP



Buy and Specify

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE BUILT WITH 3-T NYLON CORD

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, All-Weather, Sure-Grip—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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ROADS AND STREETS, April, 1956



Look for this sign:
there's a Goodyear Dealer near you.

LOW-COST SONOTUBES®

form 3-foot diameter concrete
piers for overpass bridges!



Overpass bridge—West River Parkway Crossing of Niagara Thruway section of New York State Thruway, near Grand Island, N. Y. Hendrick Construction Co., contractors.

SONOTUBE®

FIBRE FORMS

for round columns of concrete

Three foot diameter columns do the work of many more smaller sizes in the building of five overpass bridges on the New York State Thruway. Forms for caps tie-in easily with the SONOTUBE form for supporting piers.

Low-cost SONOTUBES formed these columns faster and more economically because the SONOTUBES required minimum bracing and handled easier on the job.

SONOTUBES are approved by architects and engineers and are widely used by contractors everywhere in the construction of piers, piles, underpinning and other structural uses. They save time, labor and money!

Order SONOTUBE Fibre Forms for your next job — available in sizes from 2" to 36" I.D. up to 50' long. Can be supplied in specified lengths or sawed to size on the job. For finished columns, order Sonoco's patented "A-Coated" SONOTUBES; wax-coated also available.



For complete technical information and prices . write SONOCO PRODUCTS COMPANY

CONSTRUCTION PRODUCTS DIVISION

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MONTCLAIR, N. J.

14 SOUTH PARK STREET

AKRON, IND. • LONGVIEW, TEXAS • BRANTFORD, ONT. • MEXICO, D. F.

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ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 63 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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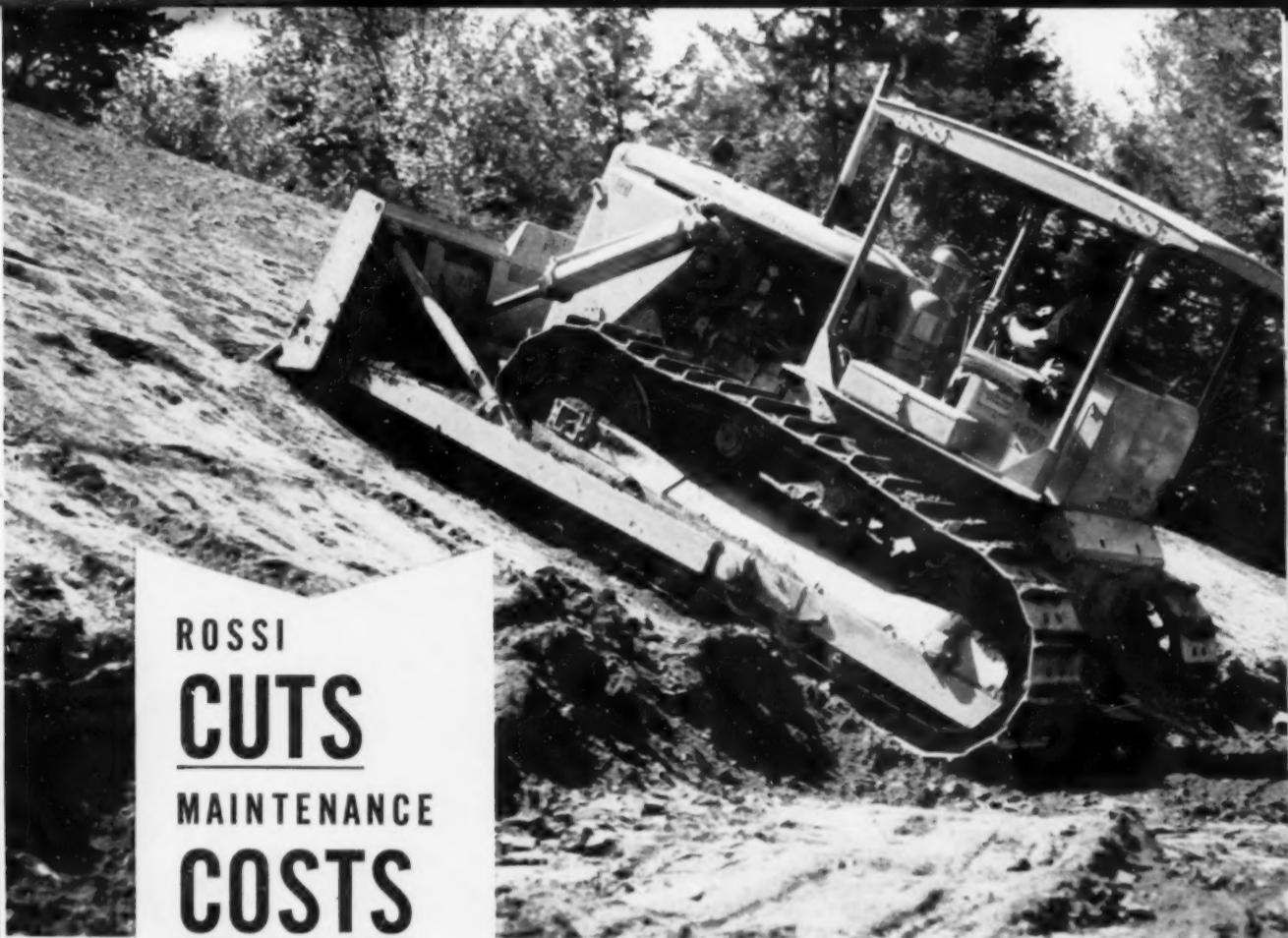
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ROSSI
CUTS
MAINTENANCE
COSTS

WITH CAT-BUILT EQUIPMENT

S. V. Rossi Construction Co., of Torrington, Conn., has found it pays to keep accurate records of machine costs. Here's a report by Mr. Adolph Rossi:

"When we buy a machine we figure the maintenance cost over a season. We've found there's no comparison—Caterpillar-built equipment has it over all other makes. We started in 1930 with machines built by two other manufacturers. Later we started trading them for Cat-built equipment because we had seen the light. Now we have all Caterpillar Diesel Tractors."

One of the machines in the Rossi fleet is the CAT* D7 Tractor with No. 7S Bulldozer, shown here grading a slope on a road construction job between Bethel and Woodstock, Vermont.

The D7 is a long-time favorite with contractors—a rugged, dependable producer. Today the new D7 (Series C) gives you the added advantage of a 128 HP engine and 28,700 pounds maximum drawbar pull. It has the long-wearing Caterpillar oil clutch; a gear

driven balancer that gives smoother performance; a new starting engine with more power, and simple, single-lever control for easier operation. Track shoes are hardened by the "water-quench" process for longer life than ever.

Get the full facts about the new line of big yellow tractors from your Caterpillar Dealer. He'll give you a demonstration right on your job, and prove the claim of lower maintenance cost with facts. He offers reliable 24-hour service as well as a full stock of Caterpillar parts—parts you can trust. Call him today.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

Lighten your maintenance cost load

EVEN in off-highway service, *Texaco Marfak* gives chassis parts full protection. That's because heavy loads won't squeeze it out, bumpy roads won't pound it out. You get long extra life for all chassis parts because of *Marfak's* longer lasting protection against wear and rust.

In wheel bearings, use *Texaco Marfak Heavy Duty*. It seals out dirt and moisture, seals itself in to assure extra thousands of miles between lube jobs, extra long life for bearings, extra safety in braking. No seasonal change is required.

For contractors who want *just one* lubricant to handle chassis, wheel bearing, water pump and other grease lubrication, there is the new lithium-base *Texaco Marfak Heavy Duty Special 2*. It pumps easily and lubricates effectively even at winter temperatures. It resists water washing and stands up in severest service.

**More than 625 million pounds of
Texaco Marfak have been sold**

Also use: *Texaco Track Roll Lubricant* to reduce maintenance costs of your crawler mechanisms. *Texaco Universal Gear Lubricant EP* to assure smooth functioning transmissions and differentials.

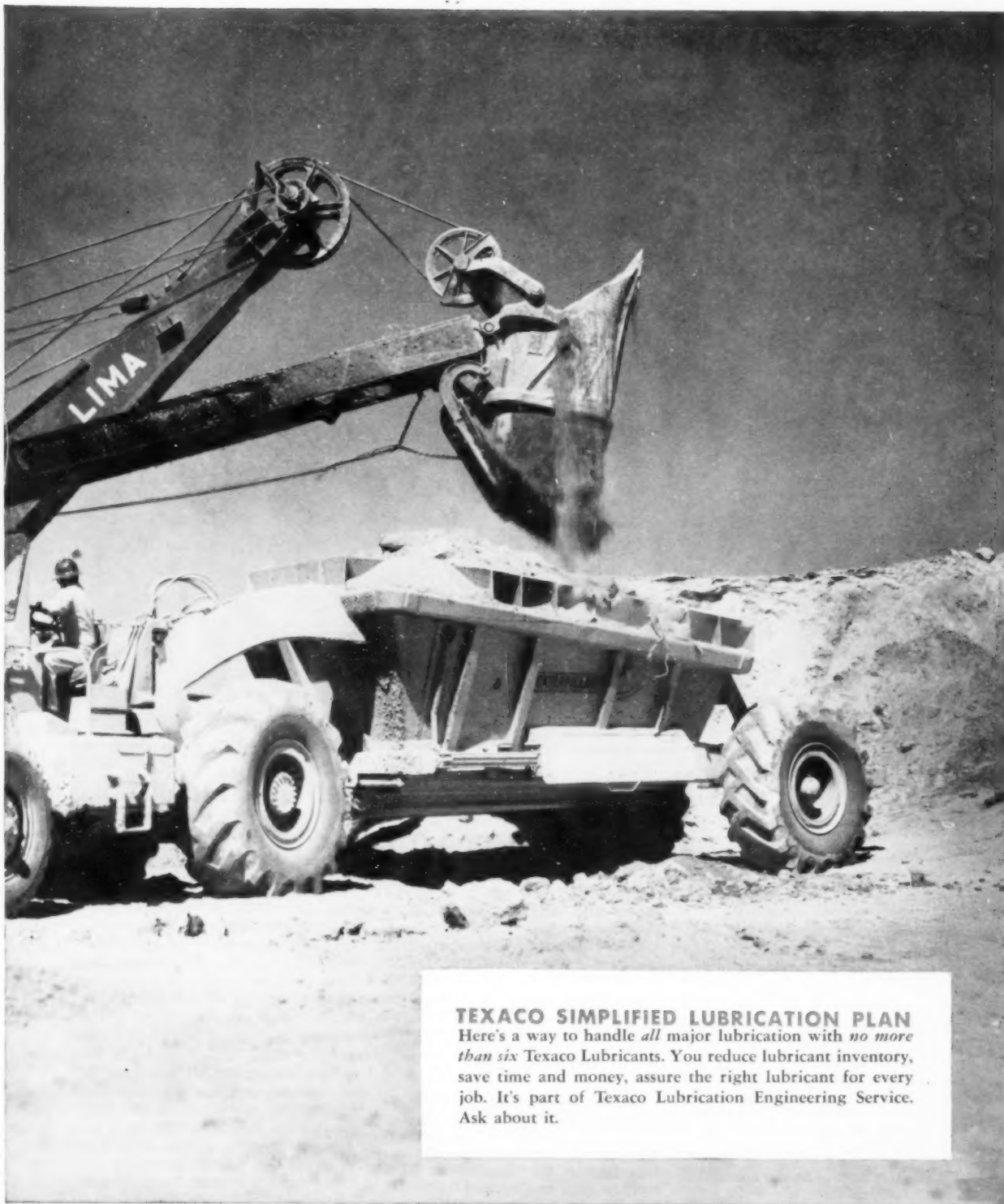
Call on Texaco Lubrication Engineering Service for help in simplifying and improving your maintenance lubrication. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN:
TEXACO STAR THEATER
starring
JIMMY DURANTE
on TV Saturday nights.
METROPOLITAN OPERA
radio broadcasts
Saturday afternoons.



TEXACO





TEXACO SIMPLIFIED LUBRICATION PLAN

Here's a way to handle *all* major lubrication with *no more than six* Texaco Lubricants. You reduce lubricant inventory, save time and money, assure the right lubricant for every job. It's part of Texaco Lubrication Engineering Service. Ask about it.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

... for more details circle 262, page 16

ROADS AND STREETS, April, 1956



Uranium miner, James T. Gray looks over his Le Roi Model 210 Airmaster compressor, which cost him only 40¢ for repairs last year.

View of James T. Gray's uranium mine located far back on Colorado Plateau. Le Roi Model 210 Airmaster compressor, shown in background, provides air power for operation.



How 55% of Uranium Miners On Colorado Plateau Cut Air-Power Costs

One miner spent only 40¢ on compressor repairs in year.

Use of LPG fuel means additional savings in time and money.

Latest reports show that 55% of the compressors sold on the Colorado Plateau are Le Roi—the dependable air compressor. Le Roi-Cleveland air legs and rock drills were also selected to help keep costs down on most of these uranium projects.

Take the case of miner James T. Gray, for instance. Even though he's a long way back in the mountains, far from repair parts, downtime and distance don't worry him. One reason is that last year he spent only 40 cents for repairs on

his major source of power—a Le Roi Model 210 Airmaster Compressor.

Six cents a gallon fuel savings provide another cost-cutting factor at Jim Gray's uranium mine. This large saving is possible because he runs the Le Roi compressor on liquid propane gas. In a year, the six-cents-per-gallon saving grows into a respectable total.

Dependable fuel supply and bulk purchases give miner Gray further dollar savings. To eliminate dangers of being cut off from fuel supply, he installed an LPG storage tank and hooked it directly to the air compressor. Once a month he fills the storage tank with LPG fuel. From this supply,

he gets a steady, reliable flow of fuel for at least 30 days—an important advantage on mining projects far back on the craggy, Colorado Plateau. It's time saving, too, because it eliminates the need for daily refueling of the compressor tank.

Both the engine and compressor in the Model 210 Airmaster are manufactured by Le Roi. This assures you complete dependability and more economy. Le Roi Airmaster Compressors also have removable, copper-finned, individual radiator and intercooler core sections, for efficient cooling under all operating conditions. 100% interchangeable valves are readily accessible for quick, easy maintenance.

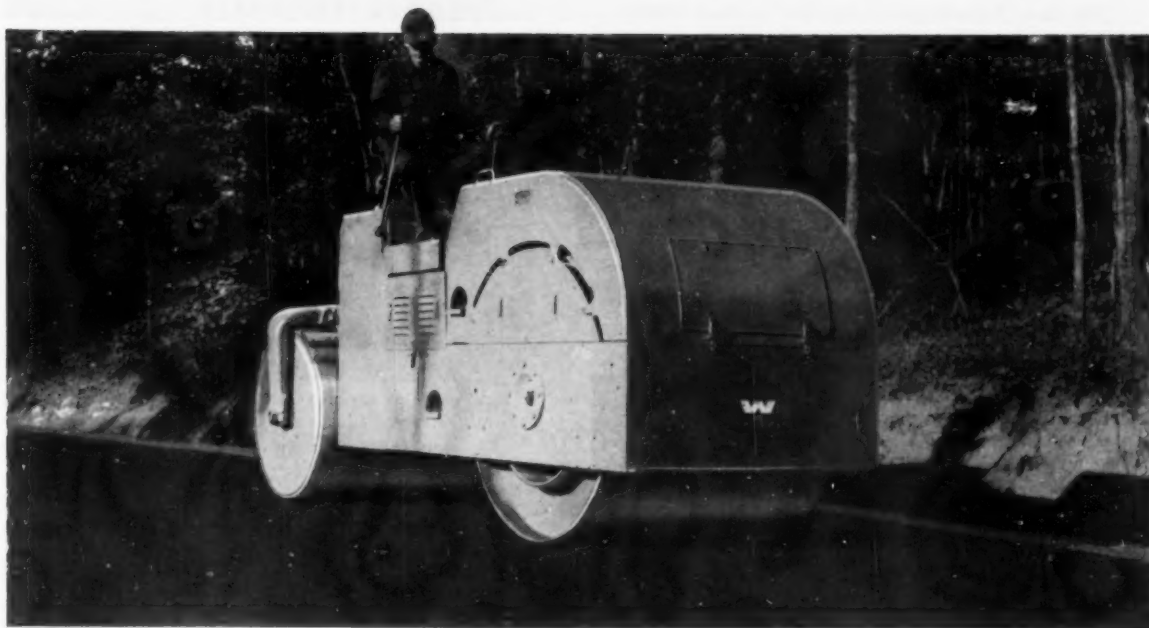


Le Roi Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin also manufactures Tractair and stationary air compressors, air tools, and engines. Write today for information about any of these products.

... for more details circle 229, page 16 C-148

NOW

HUBER-WARCO TANDEMS OFFER torque converter 2-speed transmission



Two new important features added to Huber-Warco medium and large sized tandem rollers are: a torque converter and a two-speed transmission.

The torque converter offers all of the advantages of a fluid coupling, with these important plus features: (a) available power is doubled, (b) the roller maintains approximate rolling speed regardless of grades encountered, and (c) fuel consumption is reduced.

Advantages of the two-speed transmission are: (a) at slow rolling speeds, the use of low gear maintains sufficient RPMs at tailshaft to keep governor effective, (b) makes correct gear ratio available to meet any work load or desired rolling speed, thus reducing strain on converter and engine, and (c) allows the engine to maintain sufficient RPMs to provide

hydraulic pressure for fast steering at low rolling speeds.

Other important Huber-Warco features include: the exclusive guide roll assembly that will not "scuff" (factory perfect adjustment for the life of the roller); full hydraulic steering with variable speed adjustment; two braking systems; dual controls; close curb clearance and many other features that make the Huber-Warco tandem line outstanding.

Huber-Warco medium and large sized tandems are gasoline and diesel powered and are available in 5-8, 8-10, 8-12 and 10-14 ton models. A 3-5 ton tandem with water cooled engine and torque converter as standard equipment, is also available.

Write for specifications.

For a demonstration — see your nearest Huber-Warco distributor



HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

... for more details circle 222, page 16

TEAMMMMED

IN EVERY AUSTIN-

Motor graders have come a long way since their first crude beginnings; and in the modern Austin-Western Power Grader many important features are teamed-up to give performance other graders cannot hope to equal.

Graders need great ...

MOBILITY

... so Austin-Western provides ...



... All-Wheel Drive, giving tremendous climbing power to the front drivers, with a "live" front end that drives its own weight; instead of a dead front end that has to be pushed around by the rear drivers. All-Wheel Drive results ...



... in tremendous load-moving ability by applying more power at the blade—in all materials, and under all operating conditions—power that is made still more effective by Torque Converter drive.

MANEUVERABILITY

is needed, too ...



... and with All-Wheel Steer, Austin-Western graders are twice as maneuverable as those with front steer only; steering that lets you "swing that rear end" for handling every job with maximum efficiency.

BLADE

MANIPULATION

is another important factor ...



The Extreme Blade Reach; a plus benefit on many jobs, such as finishing without leaving tire marks.

The High Lift Blade; for handling any degree of slope, from flat to vertical.

The Precision Sideshift of the blade; for keeping it under perfect control at all times.

The Completely Reversible Blade; for those rare occasions when it is necessary or desirable to grade in reverse.

The Power Graders That Have Everything

TO OUTPERFORM

WESTERN POWER GRADER

MANAGEMENT

—or control—of the machine is also important, and Austin-Western provides...



... Full Hydraulic Control—finger-tip management for instant response and precision operation. There's no lost motion—nothing to tire the operator. It's this hydraulic operation that makes Austin-Western graders so easy to manage. Now, the Blade Action...

... teams up with All-Wheel Drive and All-Wheel Steer so that all work together to move more material—and in more places. The working together of these three features—mobility, maneuverability and blade manipulation—is called...

CONTROLLED TRACTION...

... with the rear end swung to either side, although the grader moves straight ahead. All-Wheel Drive and All-Wheel Steer team up with the blade—so that the rear drivers push behind the toe of the blade—and the front drivers pull ahead of the heel of the blade; and the Austin-Western grader moves straight ahead—under perfect control—with no side slip. Whatever the material, Controlled Traction moves more of it—faster and faster.

Yes, every Austin-Western Grader has four BIG "M" features that are teamed to outperform... the extreme mobility and earth-moving ability provided by All-Wheel Drive and the Torque Converter... the extraordinary maneuverability resulting from All-Wheel Steer... the unusual versatility of blade manipulation... and the easy management of all functions by full hydraulic control.



Austin-Western
Power Graders • Motor Sweepers
Road Rollers • Hydraulic Cranes



Construction Equipment Division

Manufactured by

AUSTIN-WESTERN WORKS
CONSTRUCTION EQUIPMENT DIVISION
Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS

LOOK at all you can do with a **BLAW-KNOX ROAD WIDENER**

Spread Base Course for Road Widening

Pave Road Widening

Spread Shoulder Material

Spread and finish concrete without forms

Pave and finish Asphalt

Spread any kind of Aggregate



BLAW-KNOX

Dual Compression Trench Roller

Most flexible and economical trench roller available. Can be accurately adjusted to roll from a minimum width of 20" to a maximum of 39". The two 60" high rolls, used either "dogleg" or tracking each other, provide up to 345 pounds per lineal inch per roll. They can be hydraulically adjusted to compact to depths of 24".

You'll like the Road Widener's ability to handle many different jobs and materials. Its versatility means that you will need a minimum of labor and equipment on any road widening or shoulder job to lower construction costs. Steady high capacity of up to 200 tons per hour keeps jobs on schedule. Tandem drive wheels on all models have power to spare for pushing the heaviest trucks up steep grades. A large hopper, special conveyor belt and hydraulically controlled strike-off gates handle any type of aggregate or asphaltic concrete in widths of 2 to 10 feet. Hydraulic controls permit gradual widening of a strip around curves when laying aggregate or asphalt. Special vibrator attachment available for all models of Road Wideners spreads and finishes concrete without the use of forms.

See your Blaw-Knox distributor . . . he can give you complete details on the models 80, 85 and 95 Road Wideners.

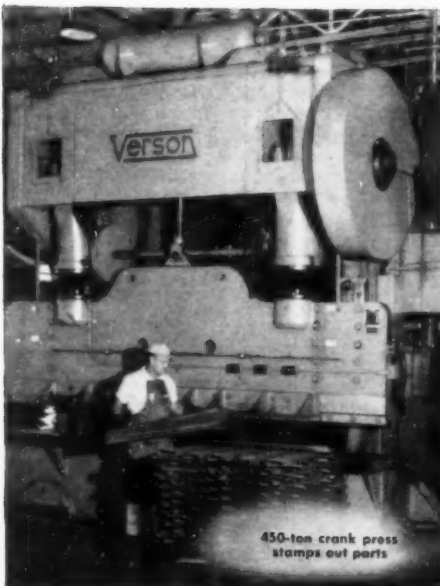


BLAW-KNOX COMPANY
CONSTRUCTION EQUIPMENT DIVISION

44 Charleston Avenue

Mattoon, Illinois

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450-ton crank press
stamps out parts



Digs at right angles

**Born a
Champion**



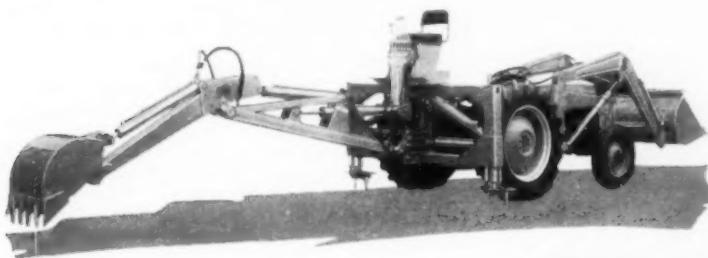
Excellent visibility
and comfort



Detaches in less
than 5 minutes

DAVIS BACK-HOE and DAVIS LOADER

With quality in every part and enthusiastic acceptance from everyone, the new Davis Back-hoe is truly a champion... a thoroughbred running mate to the Davis Loader, America's quality loader. With features you've dreamed of - at a price lower than the average - you get greater quality, versatility, comfort, and visibility. You can dig at right angles alongside roads and canals or in crowded areas. You always face your work, so at the end of the day you'll have done more work with less fatigue. You can see exactly where you're digging even at 13 feet, and you can dump your spoils all to one side with room between the pile and the hole. Individually controlled hydraulic stabilizers let you level-up on slopes, and keep you from ever upsetting. Detach the back-hoe in less than 5 minutes and use the tractor for other work. The Davis Loader and Davis Back-hoe are mass produced with modern machinery to give uniform quality at a price you can afford. See a demonstration and you'll believe it.



Davis Loader
has maximum
strength and
clearance

**AVAILABLE FOR MOST
POPULAR MAKES OF TRACTORS**

**SOLD AND SERVICED NATIONWIDE
BY BETTER DEALERS**

WRITE FOR FREE INFORMATION

Please send me information on the Davis Loader. _____

Davis Back-hoe _____ to fit a _____ tractor.
(Please Print)

NAME _____

ADDRESS _____

TOWN _____ STATE _____

MID-WESTERN INDUSTRIES, INC.
1009 S. WEST ST. DEPT. R WICHITA, KANSAS

WHAT'S NEW in Equipment and Materials

Bucket-Type Earth Drill

A new Model 200-A bucket-type earth drill has been announced by Calweld, Inc., 7222 E. Slauson Ave., Los Angeles, Calif. Larger and more rugged than previous models, this drill will bore 16 to 84 in. holes to a depth of 200 ft. On each pass it removes 37.5 cu. ft. of earth.

Drilling, hoisting and dumping are performed mechanically, and all controls are centrally located in a single unit for efficient one-man control. The bucket is unloaded by a simple hand-tripping arrangement. With an unusually wide variety of interchangeable bucket-drill accessories, boring in every type of soil is stated to be possible. This model is adaptable for boring caisson pier holes, pre-boring concrete piles, digging belled footings, drilling wells and cesspools, exploring mineral deposits, and testing soil conditions.

Model 200-A is built on a skid frame so that it can be mounted on a truck chassis or trailer. Since all equipment required for the drilling job is carried on the truck, the unit is highly mobile and maneuverable.

For more information circle 101 on Service Coupon this page and mail now.

Compressors Have Deeper Oil Pans

All two stage portable compressors and Tractairs, of Le Roi Division of Westinghouse Air Brake Co., Milwaukee 14,

Wis., are now manufactured with new, deeper oil pans. The deeper oil pans allow the compressors and Tractairs to operate in more rugged terrain than the previously manufactured units.

The new oil pans allow portable operations at angles up to 20 degrees and Tractair operations at angles up to 25 degrees, both more than double the previous operation angles and an advantage when working in rugged terrain. The 365 cfm and 600 cfm Le Roi compressors have been equipped with the deeper oil pans for several years.

All Le Roi single stage compressors, the 85 cfm, 105 cfm, and 105 truck-mounted utility unit, are still manufactured with the same oil pan as previously. The reason for this, is that these smaller compressors are used nearly entirely for street repair and maintenance work, where steeper slope angles usually are not encountered.

For more information circle 102 on Service Coupon this page and mail now.

Starting Systems for Tractors

Quick, easy starting on cold winter mornings is stated to be assured with the improved direct electric starting systems just announced by Caterpillar Tractor Co., Peoria, Ill., attachments for D6, D4 and D2 tractors and No. 977, No. 955 and No. 933 Traxcavators. Each of the 24-volt systems now includes as standard equipment, two ether starting aids and

the necessary tubing to inject vaporized ether into the air intake manifold. The use of the ether starting aids in conjunction with the glow plugs which have been successfully used in Caterpillar direct electric starting systems for some time makes it possible to start without difficulty in temperatures as low as 10° F.

For more information circle 103 on Service Coupon this page and mail now.

Automatic Buildup Wire for Welding

A new automatic buildup wire for use with the submerged arc process, announced by Air Reduction Sales Co., Division of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N.Y., is designed for use prior to final hardfacing on parts such as tractor rollers and idlers, earth moving shovel parts and cable drums. As a buildup with no final hardfacing, it is recommended for the restoration of tractor track rails and links, large shafts, pulley sheaves, mine car and crane wheels.

For more information circle 104 on Service Coupon this page and mail now.

More equipment news page 142

All-Purpose Paint

A new all-purpose black coating for protecting metal, wood or concrete against practically every exposure condition has been announced by Maintenance Inc., Wooster, Ohio. Offered under the trade name EVERWEAR J-41-B, the new paint is reputed to form an attractive, bright ebony black finish that is impervious to moisture and resistant to chemical attack by gas fumes and smoke. Because of its penetrating and spreading qualities, it can be used after a minimum of surface preparation to either preserve or restore the appearance of most materials. It is anti-corrosive above or below grade.

According to the manufacturer, J-41-B remains elastic, thus permitting it to expand and contract with metal even during extreme temperature changes. This allows its use on tanks, metal roofs, siding, drains, bridges, beams, girders, cables, window frames, all machinery, etc.

Among its applications for preserving wood are joists, floor beams, posts, trestles, mine timbers, towers, signal posts, poles, cross ties, etc. The concrete surface for which it is adapted include masonry walls, parapets, footings, retaining walls, brick and cement block structures.

For more information circle 105 on Service Coupon this page and mail now.

For more items . . . see page 142

MAIL THIS COUPON TODAY!

ROADS & STREETS 22 West Maple Street Chicago 10, Illinois

CIRCLE THE NUMBERS AND MAIL NOW!

Please send me further information on products and materials mentioned in the April Roads & Streets as circled below

About New Equipment and Literature:

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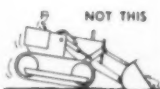
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NOT GOOD AFTER MAY 15, 1956

A READER SERVICE FOR YOUR NEEDS



—a ram-type teeth-jarring lunge and limited lift-up without pry-action.



—8,500 to 27,000 lbs. of pry-action break-out on loader shoes, on ground!

How this exclusive DROTT pry-action break-out TURNS HARD DIGGING INTO "GRAVY" compared to "shoeless" loaders!

Compare exclusive pry-action break-out capacity!

See for yourself how patented International Drott pry-over-shoe break-out—*plus bucket roll-back*—gives you tremendous *extra* yardage-getting advantages . . .

COMPARE these Skid-Shovel capacities: Model TD-6K3, 1-yard; break-out force 8,500 lbs. Model TD-9K3, 1½-yard; break-out force 11,500 lbs. Model TD-14K3, 2¼-yard; break-out force 17,000 lbs. Model TD-18K3, 3-yard; break-out force 27,000 lbs.

You can lunge into hard materials with the "shoeless" type of front-end loader—and get shorted with skimpy loads, pass after pass.

Or you can apply the scientific lever principle of patented pry-over-shoe break-out of an International® Drott Skid-Shovel. And you'll get decisively more digging, bucket-heaping power than "shoeless" loaders of comparable size can deliver.

Pry-action's tremendous yardage-getting force breaks compacted or frozen soils—lifts out embedded rocks—yanks up "anchored" materials. Also, this great *hydraulic pry-out power over big skid-shoes* shunts stresses directly into the ground—instead of to bucket, track frames, and final drives!

And only an International Drott has the shock-swallowing protection of Hydro-Spring. This exclusive "impact-cushion" reduces the consequences of shock forces to operator and tractor by 67% or more—besides increasing production and eliminating most hydraulic hose failures! Owners credit this feature, alone, with boosting loader-tractor life a whopping 25 per cent!

Your International Drott distributor invites you to prove with a demonstration how a Skid-Shovel turns hard digging into "gravy"—the bonus yardage way!

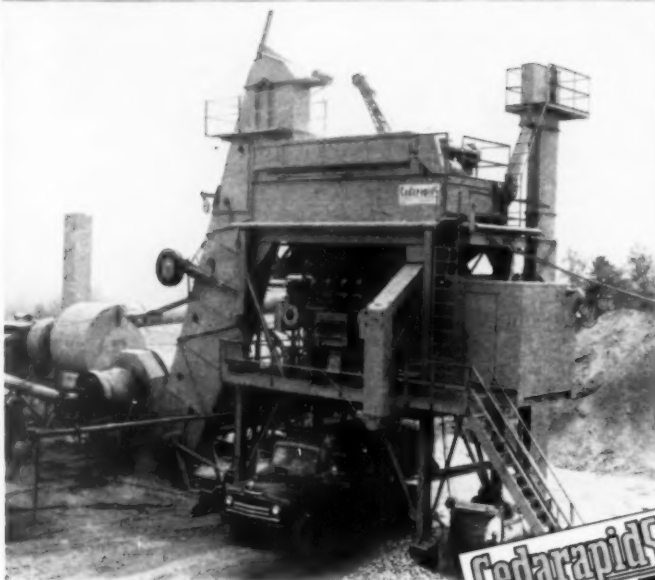


INTERNATIONAL® DROTT

. . . for more details circle 274, page 16

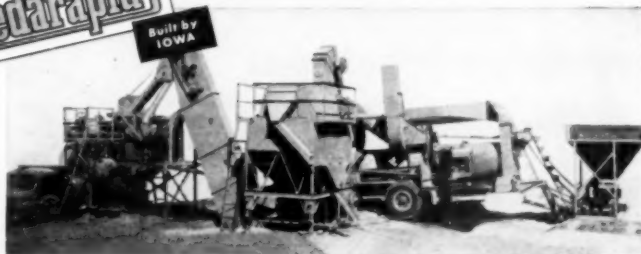
ROADS AND STREETS, April, 1956

180 TONS PER HOUR OF BATCH TYPE MIX! 45 TONS PER HOUR OF CONTINUOUS-FLOW MIX!



This MODEL G60 batch type plant, with fully automatic controls, is producing 180 tons per hour for North Carolina owner. Built-in running gear and self-erection equipment assure easy moving and set-up.

The MODEL CM continuous-flow plant (right) is averaging 45 tons per hour for profitable "commercial" jobs . . . surfacing driveways, parking lots, etc.



That's just a sample of the production range in the Cedarapids COMPLETE line

What will your next bituminous paving contract call for? A 3-ton batch of high type hot mix every minute? From 45 to 200 tons per hour of multiple aggregate continuous-flow mix? Batches for one-time orders? Single aggregate cold mix for patching or "commercial" work?

Whatever production you need . . . whatever specs you have to meet...Cedarapids has the exact plant to meet your requirements, newly designed to make the most money for you.

MORE CEDARAPIDS PRODUCERS

MODEL G40 batch type plant has all the "plus" features of the G60 except size and capacity. Designed for jobs requiring around 120 tons per hour.

MODEL H15 is a batch type plant built for jobs requiring 35 to 60 tons per hour. Stack-up, tower-type design easy to move and erect.

MASTER PLANT continuous-flow twin shaft mixing unit, gradation control unit and drier, produces up to 200 tons of specification mix per hour.

Typical Examples of High Production

Producing surface and binder mix, a continuous-flow type Master Plant met exacting Federal specifications at a 150-ton-per-hour pace.

Owner says 100 tons per hour average of his Model G40 batch type plant could easily be kicked up to over 120 tons per hour if he needed greater production.

A new Model H15 batch type plant in Canada is meeting Ontario Highway Department specs and producing 60 tons per hour.

A Model G60 batch type plant, the second purchased by a Baltimore contractor, produced 180 tons per hour for the Garden State Parkway.

See your Cedarapids distributor today.

He'll gladly recommend the plant that will make the most money for you.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa, U. S. A.



ROADS AND STREETS

Sixty-Three Years of Editorial Leadership

Washington News Letter



By Duane L. Cronk

April 10, 1956

A \$37-billion federal-aid program for highway construction over a 13-year period has cleared the House Subcommittee on Roads. Only a few days before, the Committee on Ways and Means had approved a pay-as-you-go plan for financing the program. Washington observers look for marriage of the two proposals into a complete package for the full House this month. Then, finally, debate on the floor, and passage or defeat.

It is significant and dismaying, however, that the Fallon bill, which embodies the roadbuilding program, was reported out by the Roads Subcommittee "without recommendation." Which only means that the members were in such disagreement that they were passing the "hot potato" on to the full committee.

* * *

The Congressmen were generally agreed upon the principle and scope of the program, but they fell into uncompromising debate over a number of politically inspired sections. These issues were noted briefly in last month's newsletter as possible points of contention. But by last week, they had developed into full-grown controversies, any one of which could sidetrack the highway program again this year. As one legislator said:

"The highway bill has become a gigantic grab bag. We're through drafting a road program; now we're debating 'pork' - pure and simple!"

- Labor is demanding the application of prevailing area wages (determined in Washington) to projects on the National Interstate System. The additional cost - an estimated \$5 billion.
- The private utilities are fighting for part of the highway money to be authorized for cost of relocating their facilities along new routes. The additional cost - an estimated \$500,000,000.
- Representatives from states that have built toll roads want public reimbursement for these private investments. The additional cost - \$3 billion.

None of these items was provided for in the program's financing scheme, which, the Secretary of the Treasury has insisted, is already shy by several billion dollars. It might be remembered that the Administration has pointedly stated the program must carry with it an adequate financing plan. If a Democratic bill with all of these extraneous provisions - none of which build new roads - were to come up to the President's desk, it would be interesting to hear his reaction. It may be no accident that the White House is maintaining the silence of the

(continued on next page)

Sphinx while Congressional committeemen load the highway bill to political advantage.

Actually, unless the full Public Works Committee has, by the time this is read, come closer to unanimity on these problems, industry leaders here are saying the bill's chance of passage drops down to considerably less than 50-50. A proposition sent to the floor with so many features open to debate would be severely handicapped.

The labor fracas is the most hotly contested just now. The AGC, with a background of labor sorties behind it in the complex building construction field, has turned its experience into the struggle. The ARBA, working quietly and effectively, has rallied support in key places. The contractors offer some powerful arguments. Wage-fixing by the federal government, they say, would:

- Boost the cost of all highway construction as much as 14% - 20%.
- Disrupt the economy of local rural communities close to highway jobs.
- Lead to increased federal regulations, causing unnecessary delays, red tape and higher costs.
- Interfere with the state highway departments' administration of contracts.

* * *

The labor proposal was attacked as "completely unworkable" by Congressman J. Harry McGregor of Ohio (author of the existing federal-aid highway law). Former contractor McGregor says, "The unions say they are asking for Uncle Sam to determine area prevailing wages for Interstate jobs only. But a state highway department lets Interstate jobs and secondary system jobs in the same areas. Are contractors going to bid different labor costs? And if they do, how is the contractor bidding on the secondary job going to hold his men and get his job completed?"

The contractors are afraid, too, that the Secretary of Labor will apply building construction rates - 20-25% higher than highway rates - to road projects; that the way will be opened to more jurisdictional disputes; and that there will be no provision for court review of Labor Department's arbitrary wage determinations.

* * *

Four of the unions involved have formed a compact to ram the Davis-Bacon provision through the House . . . or kill the road bill a-trying. Their chances are good. This is an election year and Congressmen need their support.

The labor case is a strong one. If Uncle Sam puts up 90% to 95% of the money, they say, why shouldn't the national labor policy be imposed? Why should highway work be the only federal-aid construction on which Davis-Bacon does not apply? Why should not labor costs be the same to every contractor in an area just as material costs are? Why should importation of low-wage workers be encouraged to disrupt competitive bidding conditions in an area?

"If a prevailing wage is omitted," the unions declare, "it will enable the same, small marauding group of predatory contractors . . . to virtually stake out the Interstate System as their private club."

Those are the arguments the contractors are up against.

NOW



Turbodiesels

96" FULL CAB COMFORT CAB

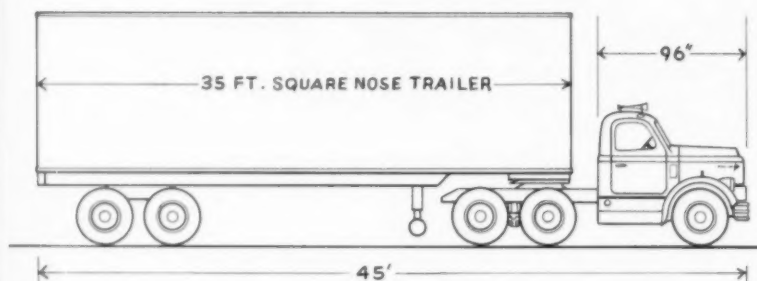
...at no premium price!

REO 96" A SERIES

with Cummins 175 h.p. JT-6B Turbodiesel

All the rugged engineering features of the *world's toughest trucks* plus exceptional maneuverability and roomy driver comfort of full-size conventional cab. *96" cab tractor pulls modern high-capacity square-nose trailers within 45' overall.* Tandem and single axles. All standard wheelbases for straight truck and truck-trailer uses, on or off highway. Models up to 48,000 G. V. W. or 62,000 G. C. W.

Reo A Series also in Gas or LPG Gold Comet short-stroke, wet-sleeve V-8s, 195—220 h.p.





REO FULL COMFORT CAB...

at no premium price!

REO F SERIES

with Cummins 175 h.p. JT-6B Turbodiesel



All the famous engineering and rugged-duty construction features of the *world's toughest trucks* in a highly maneuverable, easy-handling conventional style cab. Roomy comfort reduces driver fatigue. Smooth, low-vibration-level performance under extreme loads at high throttle.

Tandem and single axles. All standard wheelbases for straight truck and truck-trailer uses, on or off highway. Models up to 48,000 G.V.W. or 62,000 G.C.W.

Reo F Series also available with Gas or LPG Gold Comet Engines—short-stroke, wet-sleeve *sixes*—from 107 to 160 h.p.

COMING SOON! 200, 250 and 300 h.p. Turbodiesels in the new Reo Super-V 63 (COE).

● what's next...watch

MAIL FOR COMPLETE INFORMATION TODAY!

REO MOTORS, INC.
LANSING 20, MICH.

Please send, immediately, information on Reo Diesels:

"A" Series _____ "F" Series _____

New Reo Super V (COE) _____

Gold Comet "6" _____ V-8 _____ Gas _____ LPG _____

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REO

LANSING 20, MICHIGAN

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SUBSIDIARY OF

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ALUMINUM AND BRASS CORPORATION

WORLD'S TOUGHEST TRUCK

Unequalled Power...

More Work-ability



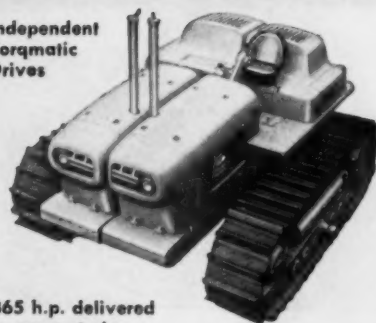
with the "Euc" TC-12 Twin Crawler Tractor

Here's a completely new concept of tractor design and performance... the TC-12 Twin-Power Euclid. It's designed and built to deliver more power, easy operation and greater work-ability—plus exceptionally fine accessibility for servicing. Power train components are matched and job proved with years of dependable performance in heavy earth moving equipment.

Powered by two 194 h.p. engines with separate Torq-matic Drives, the TC-12 gives a smooth, steady flow of power to meet every job requirement. There's no master clutch and no manual gear shifting. Three speed ranges in forward and reverse are available by simply moving a selector lever... top travel speed is 8.3 m.p.h. The TC-12 has good stability and traction on rough ground because each half of the tractor is separate and free to oscillate... the two halves can be easily separated for shipment. Write for detailed specifications.

EUCLID DIVISION, General Motors, Cleveland 17, Ohio

Independent
Torqmatic
Drives



365 h.p. delivered
to power train



The TC-12 has no equal for pulling or push loading big equipment. Smooth, steady flow of power maintains high production... provides power and speed for any job requirement.

For lower cost per ton or yard...

Euclids are your best investment



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



BUILT FOR ROCK-HARD ROAD WORK



The Allis-Chalmers HD-21 Crawler Tractor is a Natural for Tough Jobs

Chiseling roads through rock demands "something extra" in crawler tractor performance and durability, yet it's the kind of job any contractor's tractor may be required to do.

Conditions like this call for an Allis-Chalmers HD-21. Its 204-hp Allis-Chalmers engine is noted for its ability to perform with a minimum loss of efficiency even after thousands of hours of operation. Torque converter drive multiplies torque up to $4\frac{1}{2}$ times . . . develops

41,500 lb drawbar pull at low speeds . . . cushions the entire power train against load shocks.

New Tru-Dimension tracks bring a new high in track durability. Thousand-hour lubrication intervals save maintenance time. Positive seals protect idler, support roller and truck wheel bearings from abrasive wear as no other seals can.

Ask your Allis-Chalmers dealer to show you the many other features that make the HD-21 a natural for rock-hard assignments.

HD-21

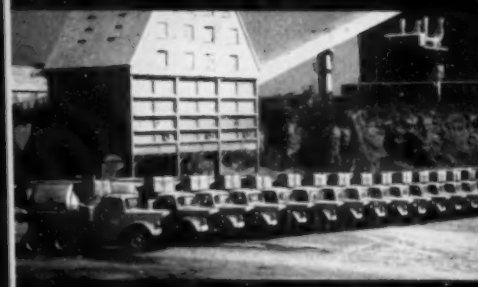
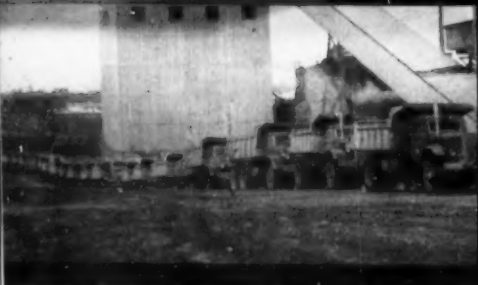
204
net engine hp
44,000 lb
torque converter
drive

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



why is Canada's "CONSTRUCTION BOULEVARD" called "MACK BOULEVARD"?



Montreal's Cremazie Boulevard might be called "Construction Boulevard." But instead, it's called "Mack Boulevard." Why? Because along a *one-mile stretch* of Cremazie Boulevard, you'll find *two-and-a-half solid miles* of Mack dumpers and mixers!

In fact, Mack is such an overwhelming favorite in this big construction hauling center that you'll rarely ever even see another make of truck there.

This landslide preference for Macks means just one thing: experienced construction men recognize Macks as the *one* truck offering the combination of stamina, rugged construction, operating economy and low maintenance that means the most profitable hauling

... for more details circle 238, page 16

ROADS AND STREETS, April, 1956

on the toughest jobs, over the roughest terrain, year after year.

Here are the Cremazie Boulevard firms that operate over 550 Macks:

Miron et Frères
Highway Paving Co., Ltd.
Montreal Quarries, Ltd.
Dominion Building Materials, Ltd.
Beaudry et Fils, Ltée.
Achille Billet, Ltée.
Adelard Boisvert

MACK TRUCKS

Empire State Building, New York 1, N.Y.

JOBS on the move

**New design, outstanding features of Allis-Chalmers
HD-11 Tractor and HD-11G Tractor Shovel
help step up output on all kinds of work**



Dozing and excavating in Paradise Valley, Pa., this HD-11 dozer-tractor is working on the job of replacing and relocating parts of a township road washed out in floods. The unit, owned by S. R. Nauman and Sons, Cresco, Pa., is shown here dozing out part of the 2,000-yd excavation, preparing grade for placing 10,000 tons of crushed stone base.



Grading, stripping and stumping are some of the jobs handled by this HD-11 Tractor with hydraulic bulldozer blade. The unit, shown here stripping a gravel borrow pit for fill on roads, is owned by Atlantic County in New Jersey. There's a full program of work for the tractor — snow removal in winter and general maintenance on 390 miles of road the rest of the year.

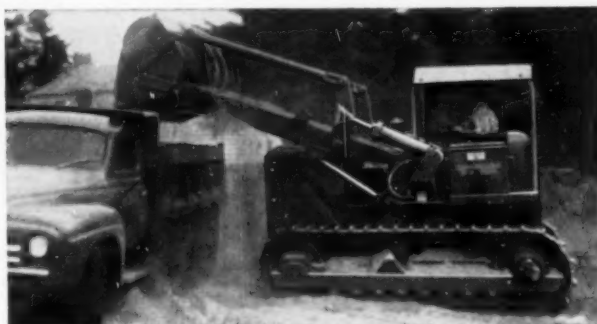


Clearing and skidding on a logging operation is the full-time job of this HD-11 Tractor. Equipped with a canopy and dozing blade, the unit is working in Deschutes National Forest for Lundgren Lumber Co., Bend, Ore.

Road building and maintenance in Franklin Parish, La., get an assist from a new HD-11 tractor-bulldozer. The unit is at work widening 40 miles of farm-to-market road near Wisner. Later, it will aid with regular maintenance on 1,750 miles of parish road.



Excavating and stockpiling topsoil for a new athletic field in Bel Air, Md., this HD-11 Tractor with bulldozer is on the job about 50 hours a week. The owners, T. & T., Inc., Whiteford, Md., use the tractor to strip topsoil, grade area, replace topsoil and landscape. About 28,000 yd of excavation will complete the job.



Excavating and dirt moving on a 12,000-yd job for a service station location is speeded by this HD-11G tractor shovel. The new unit is one of a fleet of five Allis-Chalmers tractors owned by Bass Construction Co., Seattle, Wash. A new Allis-Chalmers engine, 105 net engine hp, provides plenty of power and handles hydraulic requirements with ease.



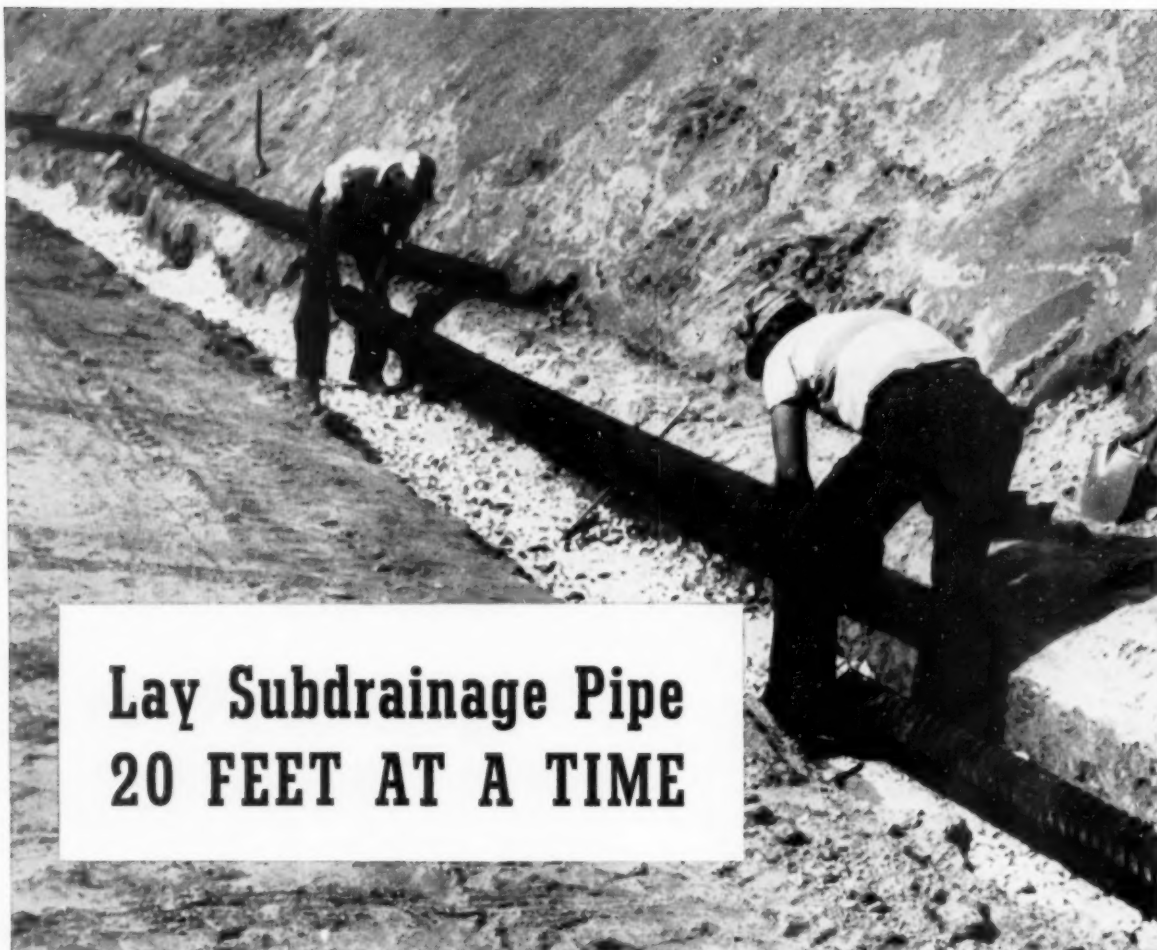
Scraping and dirt moving for Don L. Builders, Inc., Kansas City, Mo., this HD-11 Tractor and 7 1/2-yd Allis-Chalmers scraper combination moves 15 yd every sixteen minutes on a 300-yd haul. Operator Ralph Alewel states, "This tractor has plenty of power. I'm running in third gear most of the time. The unit is much more comfortable than any I've been on."

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

Your Allis-Chalmers dealer can tell you where to see HD-11's in action in your neighborhood.

ALLIS-CHALMERS





Lay Subdrainage Pipe 20 FEET AT A TIME

➤ Joints can be made quickly and easily by one or two men. No special tools are required.



Long, 20-foot lengths of Armco Perforated Pipe help you do the big jobs fast; make the small ones simple. The longer pipe lengths mean you have fewer pieces to haul, fewer pieces to handle at the job-site.

Yet even with the extra footage you don't need heavy lifting equipment. Armco Pipe has the flexible strength of corrugated metal design—providing a high strength/weight ratio. Two men can readily handle individual sections.

Long lengths mean fewer joints, too. These are made quickly, with simple coupling bands, formed to fit the pipe corrugations.

Figure your next subdrainage job with Armco Perforated Pipe and gain these important advantages. You'll be able to bid low—with profit. Write us for complete information. Armco Drainage & Metal Products, Inc., 4286 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO Perforated Pipe



For more details circle 182, page 16

ROADS AND STREETS, April, 1956

We broke these truck axles in the lab...



to save you the BIG money!

Pictured above is a group of once fine and costly INTERNATIONAL axle shafts that have been purposely twisted and broken. This is done to make sure your INTERNATIONAL rear axle will last longer and save you the BIG money—the over-the-years operation and maintenance money.

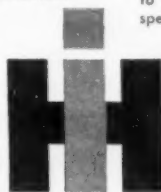
This rigorous axle-twist test is but one of many operations in the chain of INTERNATIONAL engineering that makes INTERNATIONALS *all-truck*. There are no passenger car compromises *anywhere* in INTERNATIONAL design, no passenger car engines or components asked to do a truck job.

And beyond this big plus of all-truck design, INTERNATIONAL gives you functional, practical, money-saving styling—extra comfortable driver-saving cabs—every modern driving feature.

If you use a truck to make money, see your INTERNATIONAL Dealer or Branch and start saving the BIG money!

INTERNATIONAL HARVESTER COMPANY • CHICAGO

**INTERNATIONAL
TRUCKS**



In the INTERNATIONAL Engineering Laboratory, axle shafts are tested by twisting them back and forth—hundreds of times—at stress points far beyond those of any normal truck operation. Axle shafts are approved for manufacture only when they withstand a prescribed high number of twists. Production line axle shafts must conform to the quality standards set up by this rigid test.



Model S-184 LOADSTAR, GVW 22,000 lbs. In the world's most complete line, there are trucks for every construction job, 4,200 lbs. to 90,000 lbs. GVW, with thousands of variations for exact job specialization.

**All-Truck Built to
save you the BIG money!**

Motor Trucks • Crawler Tractors • Industrial Power
McCormick® Farm Equipment and Farmall® Tractors

... for more details circle 224, page 16

ROADS AND STREETS, April, 1956

Firestone NYLON TIRES



MOVING 60,000 CUBIC YARDS A DAY TO HELP TAME THE MIGHTY MISSOURI

THE earthmoving unit shown above is typical of the many Firestone equipped units that are running round the clock to speed construction of Oahe Dam on the Missouri River. When completed, Oahe Dam will be the largest rolled filled earth dam in the world.

It is on projects such as this that Firestone nylon tires prove their superiority in reducing tire costs and downtime.

Firestone nylon tires are built for the toughest service. The treads give maximum traction and

they are extra tough to resist cutting. Double-thick sidewalls give added protection against cuts and snags.

Firestone's Safety-Tensioned Gum-Dipped nylon cord body gives greatest protection against impact breaks . . . flex breaks . . . heat failures . . . and water damage.

Let your Firestone Dealer or Store show you how Firestone nylon tires will cut downtime and increase the profits on your job.



A TIRE FOR EVERY ROAD, LOAD AND CONDITION OF SERVICE

GROUND GRIP GG WIDE BASE ROCK GRIP RG WIDE BASE ALL NON-SKID ALL TRACTION RIB EXCAVATOR

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over ABC

Copyright 1956, The Firestone Tire & Rubber Co.

... for more details circle 205, page 16



An 5-18 scraper spreads 21 yds. of clay on the fill. With 300 h.p. engine and Torqmatic Drive this "Euc" has plenty of power for fast loading, hauling and spreading even in the toughest going.



A total of 688 h.p. at work here! Two 194 h.p. engines in the Euclid TC-12 Crawler and 300 h.p. in the "Euc" Scraper made short work of getting heaped loads of sand in a hurry.



Dumping their big loads on the fly, Bottom-Dump "Eucs" made fast cycle time from borrow pit to fill and back again. They were loaded by 2½ yd. drag-lines and a Euclid Loader.

49 "EUCS"

on Heavy Road Grading Job

Contractors who know their earth moving equipment use "Eucs" on the tough, rush jobs. They know from experience that they can rely on Euclids to get more work done at the lowest cost per yard... and keep doing it month after month.

This 6.3 mile road project in Illinois is a typical example. S. J. Groves & Sons Co., J. C. O'Connor & Sons Co. and Potashnick Construction Inc. put 49 "Eucs" to work on a total of 2,238,171 cu. yds. of earth excavation. Grading operations started the middle of July and were completed the end of September. These contractors used 24 Euclid Scrapers, 23 Bottom-Dumps, a "Euc" Loader and a new TC-12 Twin-Power Crawler. 47 out of 68 hauling units on the project were "Eucs"!

Hauls from borrow pit to fill ran as high as 4500' and averaged about 3000'. Daily production was around 50,000 yds. Fills of 22' to 36' were necessary to raise the road above high water level of the Wabash and Little Wabash Rivers during flood periods. Operating personnel on this job—with the biggest fleet of earth moving equipment ever used on an Illinois road project—say that "Euc" performance played the major part in completing the earth moving in such fast time.

It's performance like this that makes "Eucs" important to the profit picture on hundreds of construction jobs... a good reason why EUCLIDS are your best investment.

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE



*Now a new **TDA**® lightweight
tandem that features...*

**UNEQUALED
PARTS
INTERCHANGE
-ABILITY**

Uses many standard parts for faster service ...new lightweight design gives 7500 extra ton-miles of payload a year*

Longer service, simpler maintenance! Most wearing parts used in this new tandem are identical to parts in widely used Timken-Detroit® standard single axles. This use of standard gears, pinions, differentials, bearings and brakes means more time on the road for operators . . . reduces parts inventories . . . and speeds service.

7500 extra ton-miles of payload a year! This new TDA tandem is over two hundred pounds lighter than any other unit of the same capacity. During an average 75,000 mile year, an operator can save 7500 deadweight ton-miles. This deadweight can be replaced with vital payload that adds up to important extra profit.

Available with a choice of either Timken-Detroit Axle connecting groups, or brackets to accept other approved chassis hook-up parts . . . plus all these additional advantages with the Timken® lightweight tandem:

TDA Inter-Axle Differential divides torque between axles—and yet permits wheels of one axle to revolve faster or slower than wheels of the other axle.

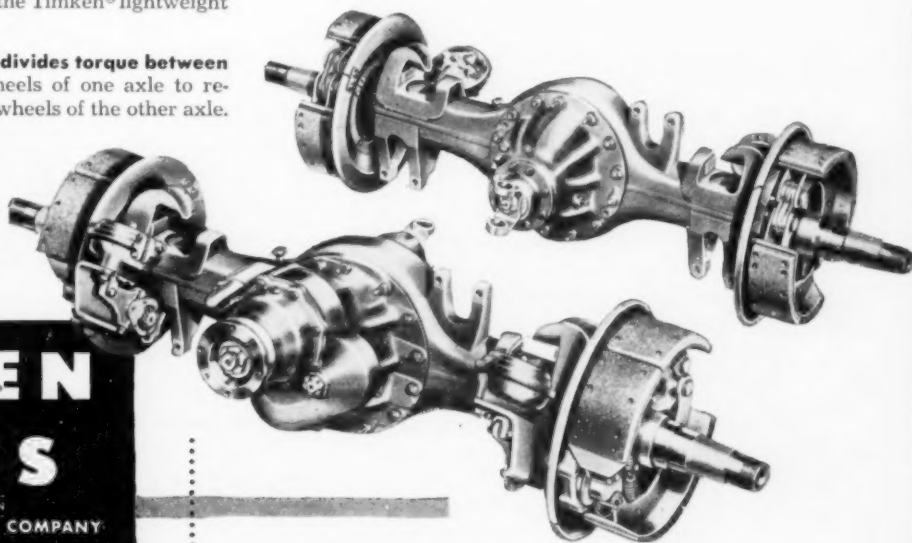
This means both axles are always doing equal amounts of work—driving parts and tires last longer!

Driver-Controlled Lockout. With TDA inter-axle differential, the driver can obtain the advantage of straight-through drive under slick or icy conditions by locking out the differential at *any* driving speed.

Big, dependable hypoid gears rotate in conventional direction, for maximum gear and bearing life.

This new highway tandem insures new payload profits, faster, easier service and operating economies for truck operators everywhere. For complete information contact your vehicle dealer or branch.

*based on 75,000 highway miles a year.



TIMKEN
Detroit
AXLES

TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN



WORLD'S LARGEST MANUFACTURER OF AXLES
FOR TRUCKS, BUSES AND TRAILERS

Plants at:

Detroit, Michigan • Oshkosh, Wisconsin
Utica, New York • Ashtabula, Kenton and Newark, Ohio
New Castle, Pennsylvania

©1956, RS & A Company



America's first *SOIL-CEMENT* road still on the job after twenty years

The two photos above show graphically that after twenty years of hard service, America's first scientifically controlled soil-cement road is still in good condition.

Recently this soil-cement road, a 1.5-mile section on South Carolina route 41 south of Johnsonville, reached its 20th birthday. The road is still giving dependable, all-weather service with little maintenance. And it is handling far greater and heavier traffic than was ever intended for it.

The three small photos at the right show part of the 20th anniversary celebration. Specimens of the pavement were removed for scientific study. When the samples were placed in a compression testing machine they were found to have a compressive strength of 922 lb. per sq.in. Back in 1935 samples tested 480 lb. per sq.in. These tests prove once again that soil-cement pavement actually grows stronger with age.

Today soil-cement is delivering dependable service under all types of climatic conditions on thousands of miles of roads all over the country. For additional information write today for free illustrated literature. It is distributed only in U.S. and Canada.

PORTLAND CEMENT ASSOCIATION

Dept. 4-68, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete . . . through scientific research and engineering field work



. . . for more details circle 247, page 16

ROADS AND STREETS, April, 1956

STRIP ACT AT ONLY 1200 RPM:

To join new and old bridge structures on the \$8,527,000 Spring-Sandusky Interchange, at Columbus, Ohio, required demolition of the existing deck. Seven air tools (3 medium sinkers, 3 heavy duty breakers and a heavy chipping hammer) were supplied by a Jaeger "600" Rotary which never ran faster than 1200 rpm. Visintine & Company, contractors.



IDLING AT ONLY 900 RPM, on this road job, the Jaeger "600" Rotary is operating these four Thor "75" rock drills at 100 lbs. pressure. Under all ordinary conditions the same compressor will hold full pressure in two heavy duty wagon drills while operating well below its full load speed of 1650 rpm. "It's a windjamming sonofagun" says John Newman, Orco Construction president, Kirkwood, Mo.

Why air costs you less with a Jaeger Roto®

Full load speed of other "600" rotary compressors is as high as 1800 rpm. Full load speed of the Jaeger Rotary is 1650 rpm, using the same economical GM 6-71 diesel engine. This difference means that, for the lengthened life of your compressor, you will produce air with less fuel, with fewer feet of engine piston travel and up to 150 fewer compressor revolutions per minute.

Further improvement in efficiency results from Jaeger's closer regulation of engine and compressor to air demands. Speed modulation over the entire range is smooth and stepless, and so instantaneous as to prevent any over-run and racing of engine.

Jaeger "125" and "365" Roto Air Plus units offer comparably superior performance. For complete details, see your Jaeger distributor or send for Catalog JCR-5.



SMOOTH AS STEAM, AT A FUEL-SAVING 1200 RPM: A Jaeger "600" Rotary and Vulcan #1 hammer teamed up to drive 14", 80# H-beam piling to approximate 100' depth on Massachusetts' Northeast Expressway, at Chelsea. Never running faster than a fuel-saving, compressor-saving 1200 rpm, the compressor maintained a hammer speed of 60 blows per minute with average penetration of 1" per blow. Coleman Brothers, Corp., contractors.



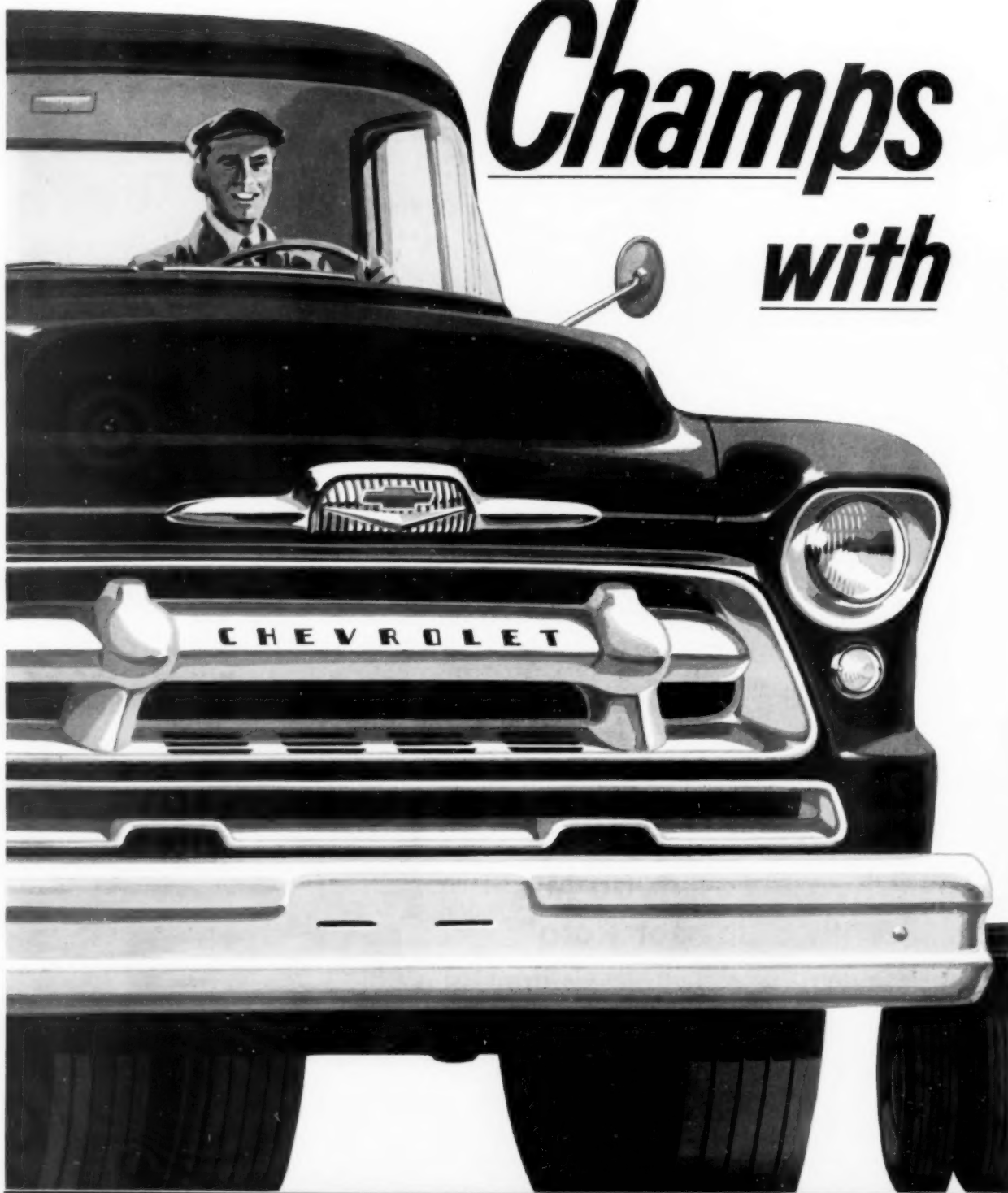
THE JAEGER MACHINE COMPANY

223 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • SPREADERS • FINISHERS • LOADERS • TRUCK MIXERS

... for more details circle 227, page 16

ROADS AND STREETS, April, 1956



Champs *with*



NEW CHEVROLET

These new Task-Force jobs pack the biggest power punch in Chevrolet truck history with the most modern engines in the industry! They're the new champs of every weight class with a V8 for every model and an automatic drive for every series!

a new power punch!

HIGH-POWERED V8's throughout the line!

They're standard in all L.C.F.'s and new heavyweight haulers (extra cost in other models). The big new 322-cu.-in. Load-master provides the short-stroke power punch in top-tonnage L.C.F.'s and in other models rated up to 32,000 lbs. G.V.W., 50,000 lbs. G.C.W.! Famous Task-Force sixes—more powerful than ever—keep rolling with traditional economy!

WORK-SAVING automatic drives in every series!

There's revolutionary new Powermatic with 6 fully automatic forward speeds, available for most middleweights and heavies! Hydra-Matic for all truck models rated up through 1½ tons! Both are extra-cost options. See your Chevrolet dealer for details on the right Task-Force model for your job! ... Chevrolet Division of General Motors, Detroit 2, Michigan.

Anything less is
an old-fashioned truck!



TASK-FORCE TRUCKS

... for more details circle 282, page 16

ROADS AND STREETS, April, 1956

Big output is built in

Individual Design

We believe that the right way to build an excavator is to match every part—from boom point to treads—to the specific rated capacity of the machine. At Bucyrus-Erie we call this Individual Design.

Here's what it means

Individual Design means striking the right balance between power, weight and speed for sustained high output at low cost over a long period of time. Bucyrus-Erie excavators match engine to dipper size so there's no waste of power; deck machinery components are not overloaded or underworked; boom strength and weight are right for the dipper size. There's never any overdipping or underpowering.

A grading project on U.S. Highway 85-87, near Greenhorn, Colo., was handled by this 1½-yd. Bucyrus-Erie 38-B. Machine owner is the Pioneer Construction Co. of Pueblo, Colo.

Here's how it pays off

This kind of design keeps Bucyrus-Erie excavators out front in production, with all parts working in smooth, efficient coordination. It keeps them on the job year after year with minimum down time and maintenance—there is no excess wear and tear on moving parts.

Individual Design is a big reason why Bucyrus-Erie excavators are still working profitably when others have lost their usefulness.

Your operations can use this kind of money-making performance so get the full details from your nearby distributor. He has all the facts on Bucyrus-Erie excavators from ⅜ to 4 cu. yd.

155E55



South Milwaukee, Wisconsin



B.F. Goodrich tires han



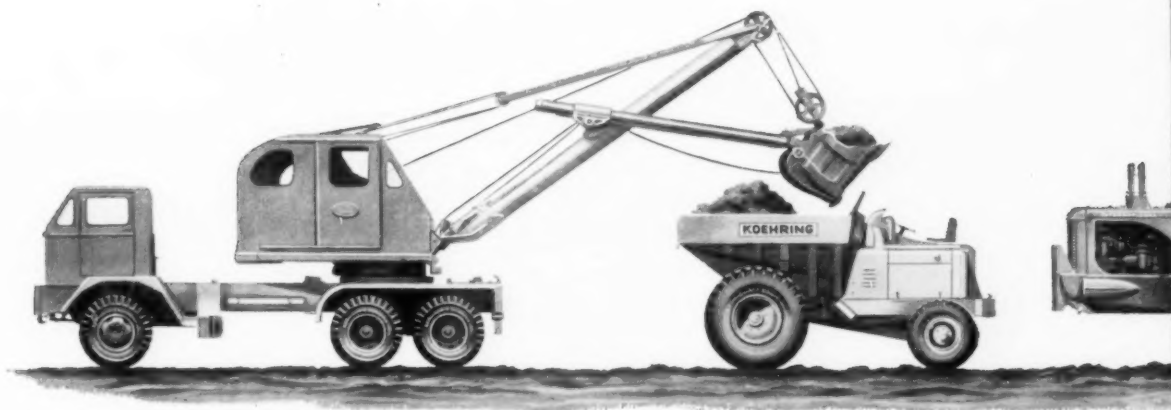
LeTourneau-Westinghouse Model B Tournapull and Model B Scraper measure 40'-6", tower 12'-7". Tournapull can make 90° left and right turns. Scraper holds 25 cubic yards heaped. Tires shown are B. F. Goodrich Super Traction on drive wheels and Earth Mover Traction on trailing wheels.

Chevrolet Task-Force stake truck Model 646 load of 13,300 pounds in a load space measure. B. F. Goodrich All-Purpose tires are designed for a truck that does a variety of on and off-the-



This massive **Mack** LRVSW dumper is designed for mining, stripping and earth-moving projects. 30-ton payloads roll on such tires as the B. F. Goodrich Rock Logger and Universal. Diesel engine develops 400-h.p.

Oliver 4-wheel, open-top twin-cable scrapers in the 4C series have a cutting blade up to 113" long, can carry up to 11 cubic yards of dirt.



Michigan Model TMDT-16 is a general purpose 12½-ton excavator-crane fully convertible to all standard front end attachments. The boom is 17'-3" long, has a diameter of 12¾".

Koehring Dumptrator unloads 16,500-lb. payload in one second. No turns are necessary at shovel or dump because speeds are the same in forward or reverse.

B.F. Goodrich Pa



The **Adams** No. 660 Diesel Motor Grader has 8 forward speeds up to 26 miles per hour, 4 reverse speeds up to 13.7 miles per hour. Unit rolls on 14.00-24 Tractor Grader Lug tires.

The body of this **Dart** Model 10-S truck rises to a height of 18 feet in dumping position, dumps at a 60-degree angle. Unit comes equipped with B. F. Goodrich Universal tires.

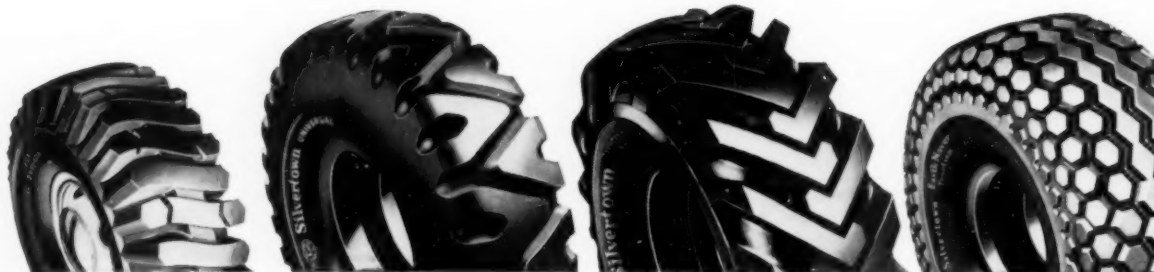
Double-Safety air braking, direct electric steering, cable control are among features. **Allis-Chalmers** TS-3



Caterpillar DW15 tractor with matched No. 15 scraper has 150-horsepower engine. Tires shown are B. F. Goodrich Ribbed Universal (front), Super Traction (drive), Earth Mover Traction (scraper).

Bay City CraneMobile may be used as crane, clamshell, dragline or pile driver. Maximum lifting capacity 25 tons. Will handle booms up to 110 feet plus 30-foot jibs.

These B. F. Goodrich tires ke



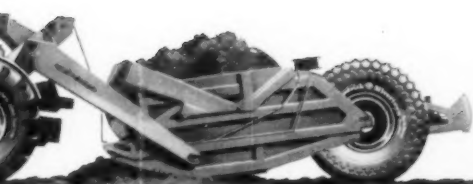
ALL-PURPOSE tires work on paved or dirt roads or in the rough on such jobs as logging, sand and gravel hauling, excavating, etc. *All-nylon* or rayon construction. Sizes 6.00-16 through 12.00-24.

UNIVERSAL tires are designed for power wheels on trucks and tractors that pull trailer equipment or for free-rolling wheels in severe service. *All-nylon* construction. Sizes 7.00-15 through 24.00-29.

TRACTOR GRADER tires deliver power to road graders, tractors and other equipment used in construction and road maintenance work. *All-nylon* or rayon construction. Sizes 9.00-24 to 18.00-26.

EARTH MOVER TRAC tires are designed for free-rolling wheels on scrapers, moving wagons and pulled equipment. *All-nylon* construction. Sizes 14.00-24.00-29.

Parade of Power



ty air brakes, selective-speed steer-
electric starting and multiple-disc
ol are among the features of the
ners TS-360 Motor Scraper.



Attachments for the **Le-Tourneau-Westinghouse** Model C Tournatractor include bulldozer (above), logging winch, tree stinger, scraper, V-type snow plow, root rake and angledozer.



Tubeless tires, power steering and tachometer are standard equipment on this **Ford** transit mix truck in the T-800 series. You have choice of 190-h.p. or 200-h.p. Y-block V-8 engine.



shell,
tons.

Austin-Western Super 99 Power Grader features 6-wheel drive and 6-wheel steering. Blade rotates 360° and raises 90° right or left. Tires are 13.00-24, 10 ply low pressure.



B. F. Goodrich Universal tires are shown on this **Euclid** Model FFD 34-ton rear-dump truck. Capacity is 28 cu. yds. heaped for payload weight of 68,000 lbs.

keep construction work rolling



VER TRACTION
igned for free-roll-
n scrapers, earth-
ngons and other
ment. All-nylon
Sizes 14.00-20 to

SUPER TRACTION tires work in sand, loam and mud on drive wheels of large dirt-moving rigs. For free-rolling wheels in reversed position. All-nylon construction. Sizes 18.00-25 to 24.00-29.

ROCK LOGGER tires are built for drive and front wheels on dump and logging trucks, cement mix trucks, quarry and construction machinery. All-nylon construction. Sizes 8.25-20 to 14.00-24.

SPECIAL compounding for extra toughness, special tread designs for every kind of work, special all-nylon cord bodies that outwear even the extra-thick tread and can be recapped over and over—these are some of the advantages B. F. Goodrich builds into its off-the-road tires. If you want lower operating costs and longer, trouble-free tire service, see your B. F. Goodrich retailer today. On-the-job service is available coast to coast from B. F. Goodrich retailers. The B. F. Goodrich Co., Tire & Equipment Div., Akron 18, Ohio.

Your B. F. Goodrich retailer is listed under Tires in the Yellow Pages of your phone book



Specify B. F. Goodrich tires when ordering new equipment

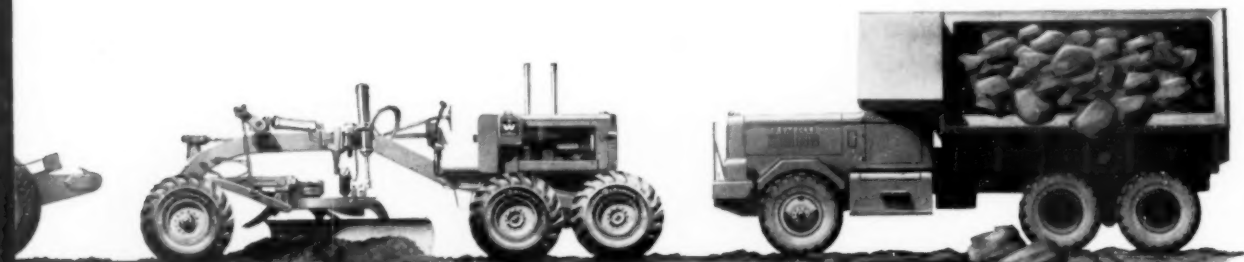
Handle the big, tough jobs



99 carries a pay-
ing 144" x 85".
ed for this type
oad work.

Up to $\frac{3}{4}$ of a mile of 24-foot roadway, 3" thick, can be produced by the **Pettibone Wood Model 42 Roadmixer** in an 8-hour day. This machine mixes cement or asphalt for highway, airport or parking area construction.

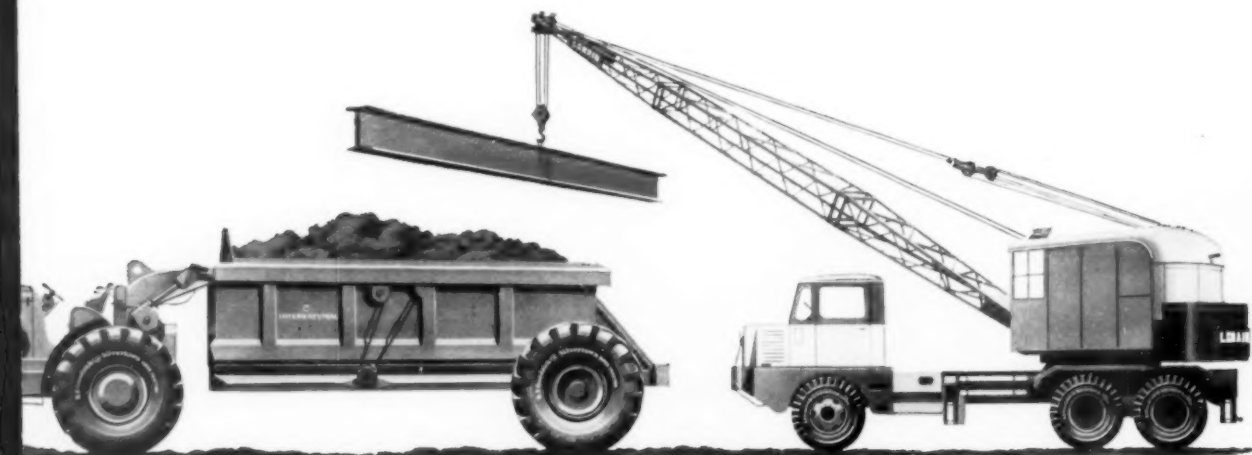
The bucket of this **Hough Payloader** raises to a maximum height of 16'-1" from a digging depth of 12" below the ground. Four-wheel drive, with 14.00-24 tires, provides maximum traction.



ies
7.5

Grading, maintenance, snow removal, scarifying, bank sloping and ditching are just a few of the jobs for which **Huber-Warco** motor graders are designed.

Side-dumping **White Autocar DC-10364S-OH** carries a truck load of 12 cubic yards. Truck weighs nearly 22 tons, rolls on 10 B. F. Goodrich Rock Logger tires.



Haul-road speeds up to 24 mph, fully loaded, are a feature of the **International Model 75 Paywagon**. Tires are B. F. Goodrich Super Traction.

Thew Shovel's Lorain MC-524 Moto-Crane handles everything from loading logs to erecting steel.

CLINTON WELDED WIRE FABRIC

helps

highways

take it!

Clinton Welded Wire Fabric gives highways that extra strength they must have to give long, trouble-free service under today's heavy loads.

Embedded in concrete, Clinton Welded Wire Fabric provides a good backbone for highways. The heavy, securely welded wires give better load distribution and control cracking because they provide a positive anchorage for the concrete.

Fully complying with A.S.T.M. and A.A.S.H.O. specifications, Clinton Welded Wire Fabric is available in a wide range of gauges and mesh spacings. For full details, write to the nearest district sales office listed below.

WHEN THEY ASK...

"is it Reinforced"

SAY YES... WITH

CLINTON WELDED WIRE FABRIC



THE COLORADO FUEL AND IRON CORPORATION • DENVER • OAKLAND

CLINTON WELDED WIRE FABRIC

helps

concrete pipe

take it!



For a maintenance-free pipe system that's strong enough to withstand heavy loads, one that will minimize corrosion, use concrete pipe reinforced with Clinton Welded Wire Fabric.

This fabric imparts highly desirable strength to concrete pipe because every joint of the fabric is securely welded to form a firm anchorage for the

concrete. This, in turn, gives better load distribution and controls cracking.

Clinton Welded Wire Fabric meets all A.S.T.M. specifications and is available in a complete range of gauges and mesh sizes. So, next time you need pipe—it'll pay you to specify concrete pipe reinforced with Clinton Welded Wire Fabric.

3468

WHEN THEY ASK...

"is it Reinforced"

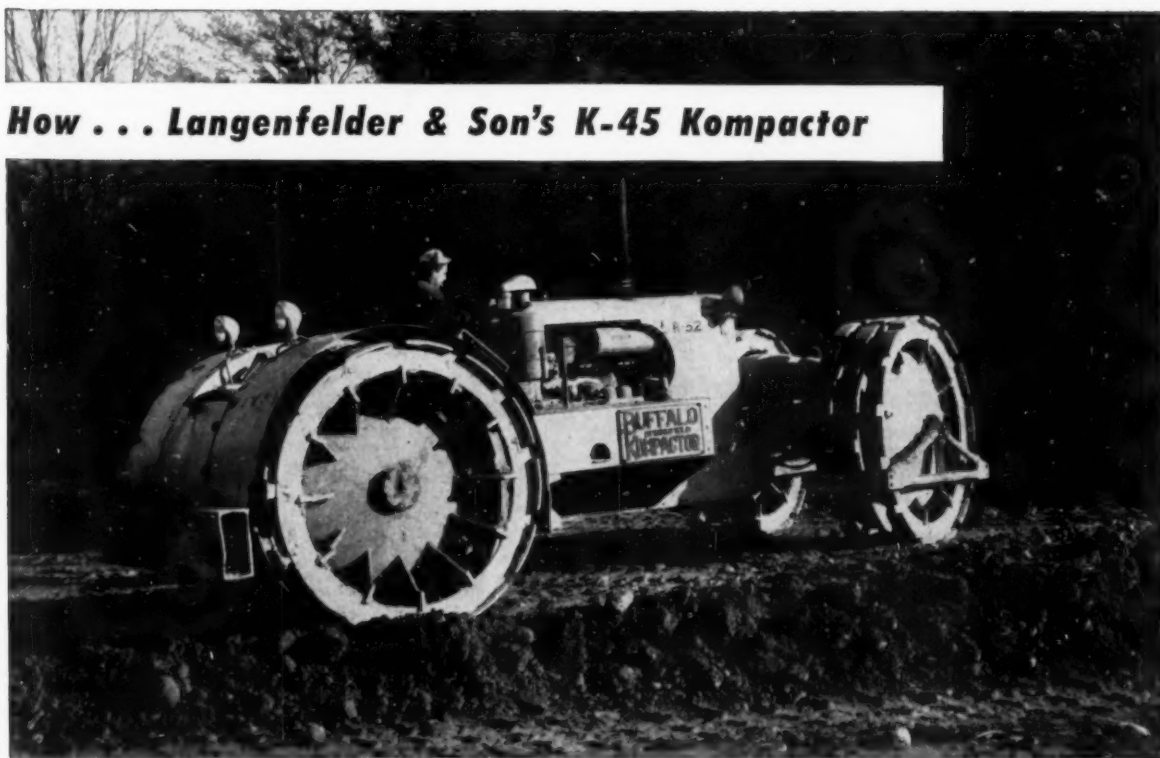
SAY YES... WITH

CLINTON



WELDED WIRE FABRIC
THE COLORADO FUEL AND IRON CORPORATION

Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles
Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Wichita
CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg



How . . . Langenfelder & Son's K-45 Kompactor

is cutting time and compaction costs ... on one of the toughest sections of the Massachusetts Turnpike

C. J. Langenfelder & Son, Inc. of Baltimore (owner of three Buffalo-Springfield K-45 Kompactors) has the largest single contract, money-wise, on the eastern half of the Massachusetts Turnpike, and the second largest on the entire 123 mile project. Their 5.37 mile section includes 17 bridges and the big Auburn Interchange.

Langenfelder's problem of proper compaction in the shortest time at lowest cost on this project is solved by the Buffalo-Springfield K-45 Kompactor.

The self-propelled highly maneuverable K-45 gives the highest degree

of compaction with fewest passes. Its "Interrupted Pressure Principle" directs all compaction effort downward—the pads enter loose material with minimum displacement. Normal compaction time and costs are drastically reduced. It leaves a smooth finished surface that prevents moisture from penetrating the material after rolling is finished. And, the K-45 works close

to bridge abutments, eliminates 90% of the hand tamping.

Every way you figure it, the K-45 Kompactor saves time, meets density requirements and cuts costs. Check today with your Buffalo-Springfield distributor for full facts . . . and send for the latest K-45 Kompactor bulletin No. S-67-455.

BUFFALO
ROLLER COMPANY



SPRINGFIELD
SPRINGFIELD, OHIO, U. S. A.

THE LEADER IN COMPACTION EQUIPMENT DESIGN AND MANUFACTURE

... for more details circle 190, page 16

Drainage for Dallas

Marion 93-M Doubles As Clamshell and Heavy-Duty Crane on Sewer Job

An unusual drainage project in Dallas, Texas, involved laying a 15-inch and an 84-inch pressure sewer almost simultaneously. A Marion 93-M, serving first as a clamshell and then as a heavy-duty crane, played an important part in the job.

Much of the excavation work was handled by the Marion clam, but its most dramatic job involved the placement of 100 joints of 84-inch steel and concrete pipe weighing 41,000 lbs. each.

Trench work involved a cut 30 feet wide and 30 feet deep to accommodate the laying of the two sewer lines in one operation. Tunneling beneath two boulevards was involved.

For more information on the many jobs a 93-M can handle on construction jobs, see your nearest Marion Distributor or write for Bulletin 397-E.

**Whatever your job requirement,
there is a Marion machine
of the right size and type for greatest efficiency**

MACHINE	SHOVEL CAP. CU. YD.	MAX. CRANE RATING IN TONS @ 12' RAD. EXCEPT AS NOTED			HOE CAP. CU. YDS.	ASK FOR BULLETIN NUMBER
MARION 32-M	¾	*17½	*25	*25	¾	416
MARION 43-M	1	*27	*35	---	1-1½	415
MARION 362	1½	37	---	---	1½-2	398-D
MARION 372	---	43	---	---	---	---
MARION 83-M	2	60	---	---	2-2½	414
MARION 87-M	---	75	---	---	---	---
MARION 93-M	2½	80	---	---	---	397-E
MARION 101-M	3	84	---	---	---	417
MARION 111-M	4	169	---	---	---	402-B

*Rated at 10' Radius in Accordance with General Practice.

MARION POWER SHOVEL CO.

MARION, OHIO, U. S. A.



Please send me Bulletin
397-E on the Marion 93-M.

Name Title

Company

Address

City State



The most important date for the Construction Industry in 1957

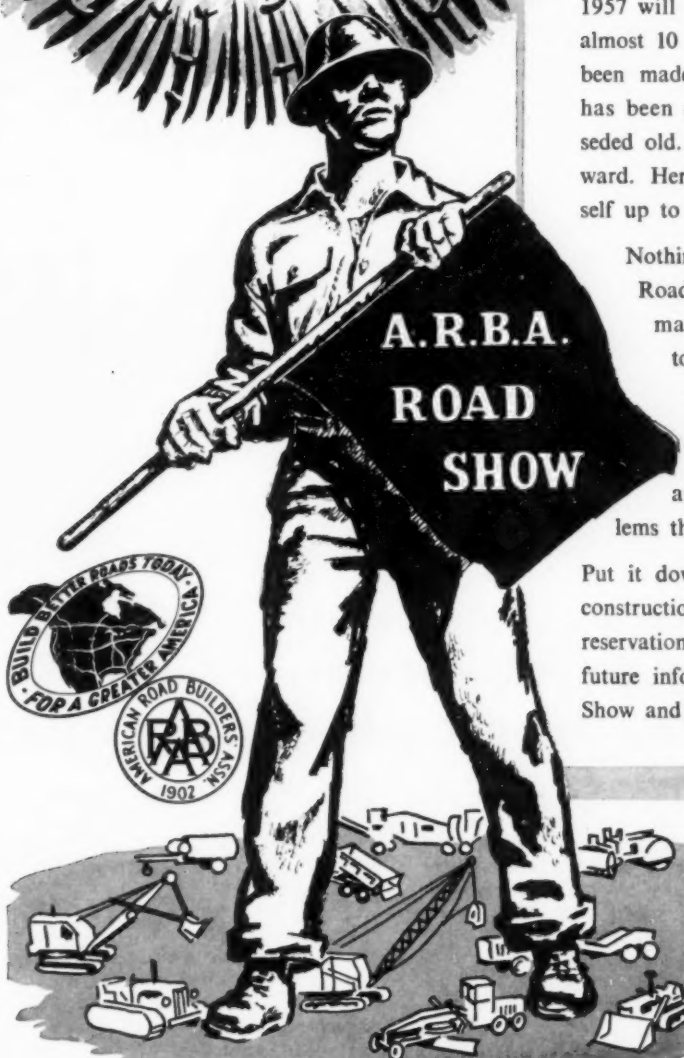
JAN 28
1957

A.R.B.A. ROAD SHOW and CONVENTION PLAN NOW!

1957 will bring with it the first Road Show in almost 10 years! Tremendous advancements have been made in this last decade. New equipment has been developed. New methods have superseded old. New cost-cutting ideas have come forward. Here is the time and place to bring yourself up to date on all the new developments.

Nothing is being spared to make this 1957 Road Show the greatest indoor exhibit of machinery and materials ever gathered together. At the same time, the A.R.B.A. convention will give you an opportunity to learn about new methods and practices and hear outstanding authorities discuss the solution of problems that are bothering you.

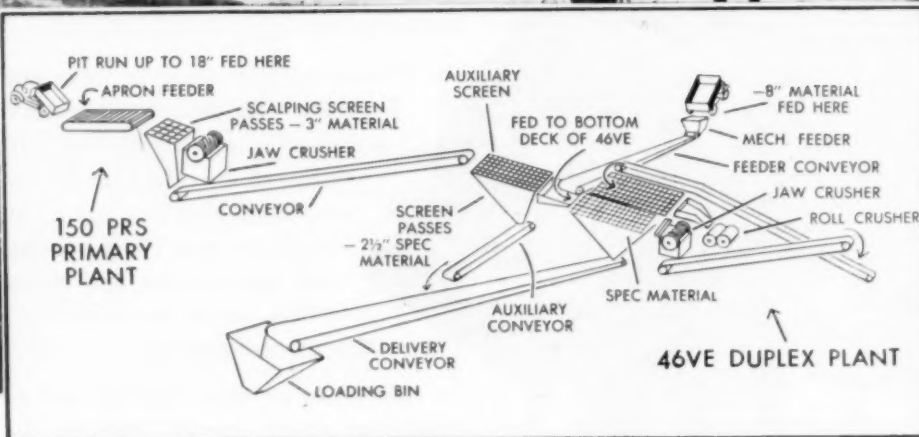
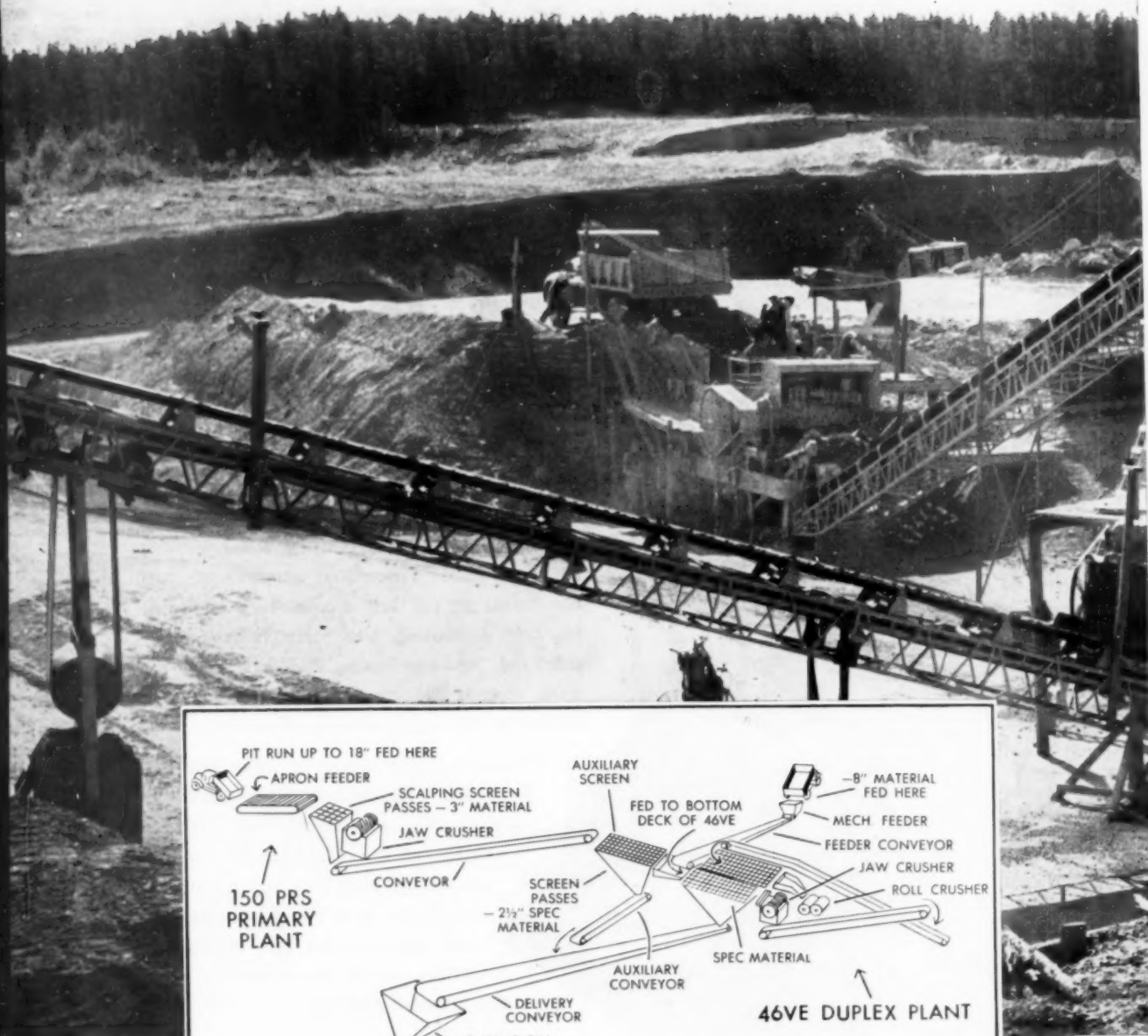
Put it down as the most important date for the construction industry in 1957. Write for data on reservations. Ask to be put on the list to receive future information on the 1957 A.R.B.A. Road Show and Convention.



AMERICAN ROAD BUILDERS' ASSOCIATION

World Center Building
Washington 6, D.C.

... for more details circle 240, page 16



Portable crushing setup produces 5000 tons per day under freak pit conditions

● 5,000 tons is a lot of 2½" material to produce in a 10 hour day. And when you have to crush approximately half of it, you've got a job on your hands.

This was the task confronting Dexter Construction Company, which had contracted to supply material for all the roads at Canada's largest Army Base, located at Gagetown, New Brunswick.

Contractor finds freak pit conditions

Dexter found that half their pit consisted of material ranging from sand

to 8" rock. This was swell, but to their dismay, they discovered that the other half contained a high percentage of 15" to 18" boulders. These could not be crushed with Dexter's presently owned equipment, yet in order to maintain road building schedules, all pit material had to be used. The problem was how to obtain the fastest, most economical production.

How the problem was solved

Dexter overcame this threatened production bottleneck by installing two

portable crushing plants. One, a PIONEER Model 150 PRS Primary plant handles material from the part of the pit which contains the boulders.

The other, a big PIONEER 46VE diesel-electric Bottom Deck Feed plant, takes the 8" maximum material from the remainder of the pit and at the same time, serves as a secondary plant for the 150 PRS.

By an ingenious arrangement of materials flow, output of both plants is delivered to a common loading point via the same 36" x 105'



PIONEER Conveyor.

Working in conjunction, these two plants utilize all pit material and produce the necessary 5,000 tons in a 10 hour day.

Why the 150 PRS was chosen

After careful study, Dexter picked the 150 PRS for the job because its scalping screen and big 2036 jaw crusher enables it to handle large rock and at the same time, maintain unusually high output. The two-deck screen located ahead of the jaw crusher, removes material under 3" so that the jaw handles only rock needing primary crushing.

How these plants team up

Crushed material from the jaw in the 150 PRS primary plant, plus the bypassed materials, are separated and

sized by a 5 x 12 two-deck auxiliary screen located between the two plants. Specification material is removed here and conveyed to the loading bin.

Material in need of further processing is then fed to the *bottom deck* of the 46VE along with pit run material containing the 8" maximum rock.

How Bottom Deck Feed works

With bottom deck feed, specification sizes are immediately removed. Oversize goes to the jaw crusher, then to the top deck where specification sizes are again removed. Oversize from the top deck is sent to the roll crusher for final reduction. This exclusive Bottom Deck Feed feature provides *twice* the effective screen area and thereby increases output. In addition,

the operator can easily equalize loads carried by the roll and jaw crusher, *while the plant is operating*, thus always keeping the plant at peak crushing capacity regardless of changes in size of materials. This feature also permits closer gradation control.

For information on PIONEER's new Model 150 PRS Plant and 7 different sized Bottom Deck Feed Plants, write Pioneer Engineering Works, Inc., Minneapolis 13, Minnesota (a subsidiary of Poor & Company, Chicago).

Pioneer
Continuous EQUIPMENT

BIGGER PAYLOADS AND FASTER CYCLE TIMES FOLLOW THIS No. 12

on the northeastern extension of the Pennsylvania Turnpike



Marsolino Construction Company, Uniontown, Pa., is making efficient use of big yellow equipment on the Norristown-Scranton extension of the Pennsylvania Turnpike. Among the Caterpillar units in its line-up are five DW21s hauling, three D8s bulldozing, two D8s push-loading and two No. 12s grading haul and access roads. This use of the No. 12s enables Marsolino to get even bigger production from the high-speed, big-capacity CAT* DW21s.

On contract after contract where money-making performance calls for long hauls on wheels, the maintenance of haul roads by motor graders results in bigger payloads and faster cycle times. The fast-working No. 12 has proved itself ideal for this purpose. Operators like its easy, accurate steering, positive action of mechanical controls and quick blade positioning without leaving the platform. And the unobstructed vision allows them to see the job while seated.

On this job, Caterpillar-built equipment is working 9½ hours a day, 6 days a week. A. J. Marsolino says: "Modern highway building requires a huge investment

in heavy equipment. We believe in buying the best. We know from experience the best buy is Caterpillar. That's why we have standardized on it for our earth-moving and grading. Down time is a minor item but when we do have it, the parts service is excellent."

A minimum of down time and efficient, one-stop parts service—these are just two of many reasons it pays to standardize on Caterpillar. For the complete data on every earthmoving unit from graders to scrapers, see your nearby Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**USE CAT EQUIPMENT
FOR MONEY-MAKING
PERFORMANCE**

ROADS AND STREETS

Big Slide . . . HOW IT WAS

CLEANED UP WITHOUT MISHAP

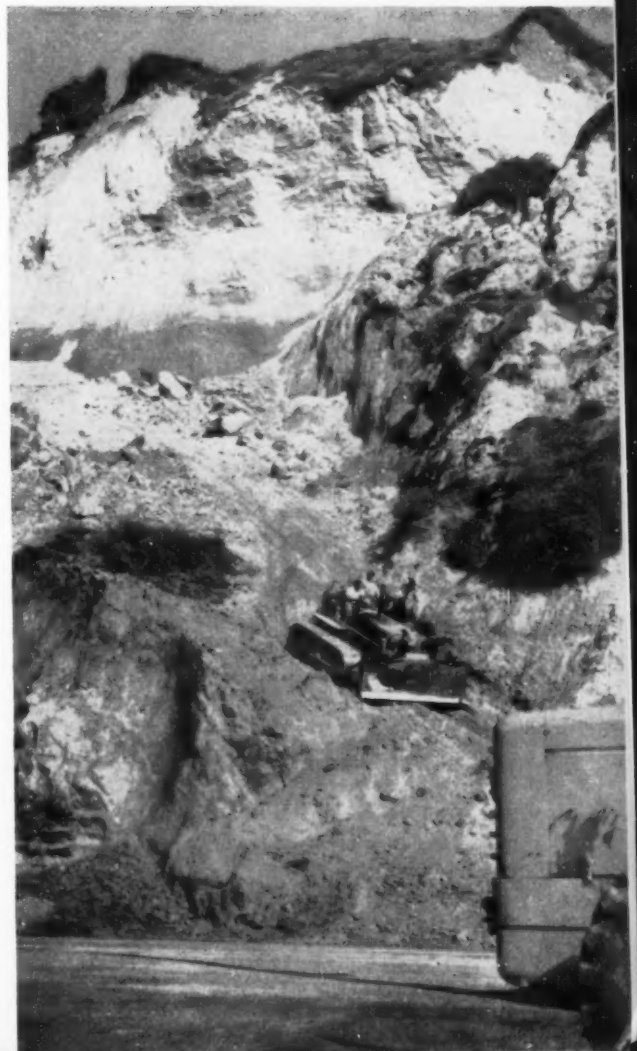
How men and equipment work around the clock for nine days to remove 225,000-cubic-yard roadblock in Los Angeles

Special to Roads and Streets

A ROARING landslide, which plunged nearly a quarter of a million cubic yards of unstable earth down across southern California's famed Pacific Coast Highway near Malibu, has been handled successfully under emergency conditions without a single mishap. Representing well-organized staff work at its best, removal of the 600-foot-long block of earth was done by the Department of Street Maintenance of the City of Los Angeles. Department personnel, city-owned equipment and other equipment rented from contractors cooperated in the emergency.

The disaster was not entirely unexpected, even though it created one of the department's worst emergencies. Historically, the area has been replete with slides. Gradual and sudden movements of earth have occurred over the years all along the 280-foot sheer cliff from Santa Monica to Malibu. Until the Pacific Coast Highway was constructed along the

- Operator of this Cat D6 mounted dozer did heroic work pioneering benches from the slide top and shoving material over to the shovels.





● How the Pacific Coast Highway was covered and blocked by the slide on the night of February 3.

toe of the cliff three decades ago, damage was limited to the beach along the ocean front. When the road was built, which skirts the foot of the cliff, damage from sliding earth became more direct.

Slides have been especially bad in the vicinity of Pacific Palisades, where the most recent movement occurred. At this point the cliff is composed of beach sand, leached-out oil bearing sands and shales, light earth and loam, and bedding planes of diatomaceous earth. While the material is light (a cubic yard weighs slightly more than a ton), the superimposed load on the exposed face has frequently been too great. Heavy rains soak into cracks, which open up along the top, center, and toe. Earthquakes have frequently helped to start the slides. Serious slides occurred along

● Helicopter view showing extent of huge slide in the Pacific Palisades, as seen shortly after emergency service road had been cut through the toe. Layout of shovels at each side of slide is shown.



the area in 1941 and 1943, with other less dangerous movements in other years.

Such was the background in late January, 1956, as department engineers and maintenance men checked the area daily. A three-day, 9-inch rain ending on January 26 had accentuated certain crack patterns along the top of the cliff near Pacific Palisades. Coincidentally, a 6.5-intensity earthquake occurred 200 miles to the southeast, and the rolling aftershocks jarred the cliff, endangering it still further. Director Ben R. Paris and his assistant, L. C. Jones of the Los Angeles department of street maintenance, were worried, not so much about the movement of earth as about the possible loss of life if a major slide turned loose. The Pacific Coast highway, which formerly carried U. S. Route 101, still is a major-traveled State route carrying traffic to Oxnard, Ventura and Santa Barbara. Under agreement with the California Division of Highways the maintenance of this road, like all state highways within the Los Angeles City limits, is a function of the department under Paris.

Daily Watch Set Up

The steadily expanding crack patterns at the top of the cliff told a mute story to general superintendent L. N. Hoefs, who directs field and plant activities under Paris and Jones. Under Hoefs' direction, surveyors had set up telltale markers on line and grade to show at a glance whether the material was moving. Suddenly, without warning, a 160-foot top section of the cliff dropped vertically for 27 feet on the morning of January 31. There was an imperceptible bulge in the center of the cliff, and some cracking in the asphalt roadway pavement far below as uplift pressures from the superimposed load began to assert themselves. Hoefs immediately ordered a 24-hour watch established. Flagmen had orders to stop traffic immediately if the mountain began to move. The day was Tuesday.

Three days went by, and the cliff appeared to be at rest. The top cracks remained stationary. No further bulging in the face had been measurable. There was no rattling of loose stones; no rivulets of dirt and dust which foretell slides. The rainstorm had spent its fury, subsided, and drained away. Things appeared safe, so Hoefs decided to remove the watch. At 4 p.m. on Friday, the flagmen removed their barricades and went home.

It seemed almost as if Mother Nature had waited for this moment. Exactly an hour and five minutes later



● A Northwest shovel, Michigan tractor-shovel and Hough Payloader team up with 10-yd. dump trucks to work the slide off the highway.

the entire 280-foot face gave way with a roar and a cloud of dust. A section 600 feet long plunged down toward the sea. The highway was obliterated in seconds under 50 feet of dirt. The slide rolled out beyond the pavement, over a narrow parking area, across a beach, and into the blue waters of the Pacific.

Frightened motorists who managed to stop their cars just in time at the toe of the slide could report only that the highway ahead suddenly was hidden in a cloud of dirt and dust. Officials could make only one reasonable assumption, based on the fact that traffic is usually stacked bumper to bumper on this stretch of highway at 5 p.m. on a Friday afternoon. Their assumption was this: a major disaster had occurred. How many automobiles and people lay buried under the debris was anybody's guess.

Equipment to the Rescue

Hoefs received the bad news at home minutes after his department had been alerted by the State Highway Patrol. Immediately the maintenance organization slipped into high gear. The superintendent for the west district, Harry D. Offner, was notified. Supervisors McFadden and Eaton, men with long construction and maintenance experience, were called out. There was no clashing of gears, because the department has been organized to handle emergency work as smoothly as it handles routine maintenance.

Salaries for emergency personnel

already were provided for in the budget. A long-standing agreement with the State provided for reimbursement for the cost of handling the emergency on a force-account basis under a 10-day period; reimbursement was provided over a 10-day period if the work was let by contract. Equipment rental already was authorized under department budgetary provisions. The highway simply had to be restored under the 10-day demarcation line between force-account and contract work. Time was the governing factor. So the wheels began to turn on a force-account basis.

A contractor located about a mile up the highway had a 1-yard truck crane with a clam bucket. It was rented for 24 hours to start clamming some of the upper material away. Some department maintenance equipment was on the scene — parked there during the 24-hour vigil just before the slide. It included a D8 Cat dozer, an Adams motor grader, and a Hough Payloader. Operators rushed out to man these machines. Barricades were thrown up and traffic, guided by state highway patrolmen, began to detour the scene around Chautauqua Boulevard.

Early darkness was setting in when the operator of a city-owned Model C Tornadoer, which was parked in a department yard at San Fernando Road and Figueroa Street near downtown Los Angeles, received word to proceed with all possible speed to Pacific Palisades. Many a



● One of the department's Adams motor graders puts the finishing touches to a detour at ocean side of highway, in case a new slide turns loose.



● The 280-ft. high cliff where the slide occurred. Temporary asphalt traffic lanes in foreground.

startled motorist, passing through Hollywood that Friday night, still remembers the terrifying spectacle of the big rubber-tired machine, its big dozer blade flaring under the machine's own headlights, lumbering west on Sunset against incoming traffic. Motorcycle policemen were startled, too, until the Tournadozer picked up an escort. The machine was at work on the toe of the slide less than 1½ hours after word was flashed. By 9 p.m. that night it had cleared a service road through the slide toe:

Douglas Aircraft Company hurried one of its biggest truck-mounted generating units to the scene. It was the type of power unit which lights maintenance areas around planes, when work is performed at night. The unit stayed on the scene on a voluntary

basis until the emergency was ended. Other night lighting equipment, city owned or rented from Otto K. Olson Company, also was rushed in.

Maximum Cooperation

Los Angeles construction firms cooperated to the fullest. A 2½-yd. Northwest 80-D shovel owned by C. G. Willis & Son, was loaded immediately on a trailer and rushed out. Ordinarily the truck movement of an 80-D calls for removal of the boom and dipper stick to lighten the load, and an over-width permit. In this case the machine was shipped intact so it could begin work immediately. State highway patrolmen escorted the machine. A Model 6 Northwest, with a 2-yd. dipper, also was rushed out.

By Saturday morning the equip-

ment array was impressive, to say the least. In addition to that already mentioned, there was a 2½-yd. Michigan tractor shovel, a D6 Traxcavator loader, 3 Hough Payloaders, 3 Caterpillar 12 motor graders, and 24 dump trucks of various makes — all on a rental basis — capable of hauling 10 cu. yd. per trip from the shovels. There were three D8 and a D6 mounted dozer. The latter machine, largely through the skill and courage of its private operator, was destined to do some of the most dangerous but necessary work of all: benching the material off from the top and shoving it over the side toward the shovels and other loading equipment.

Problems Encountered

Chief problem centered around two questions: (1) how should the excavation of the slide be handled? And (2) where should the material be dumped?

Hoefs himself provided the answer to the first question shortly after one of the shovels dug in beyond the danger point. When minor slides started to roll down around the shovel tracks, Hoefs ordered the operators to stay back beyond serious danger points. Dozer operators, working from above, then pioneered benches next to the solid material along the cliff face, and began to shove loose dirt over the side toward the shovels and tractor loaders. This general scheme of shoving the material from the top toward locations where shovels could safely work was followed until the slide was cleaned up. An approximate 1:1 slope line was established.

The question of where to dispose of material was serious. Owners of an adjacent beach protested the disposal of nearly a quarter million cubic yards of material at that point because they believed the beach might be ruined. State hydraulic experts then pointed out the advisability of centering the dump in one given area and working a dumped fill seaward in jetty form. The Pacific Ocean at this point has a curious littoral drift which eats thousands of cubic yards of material in any day, carrying it on south where it is deposited evenly all the way to Palos Verdes Point. Thus assured, beach owners stopped their protest. By noon Saturday, or within 19 hours, slide removal was in high gear. A power shovel and tractor-loaders worked from each side; dozers worked from the top.

To every man on the job the big
(Continued on page 106)

Electronics and Our Changing Profession

There was an air of excitement as well as enthusiasm in that little room in Chicago. The time was March 7. The occasion was a conference on improved engineering methods. The topic was, as the conference leaders put it, the marriage of photogrammetry and electronics.

It took this meeting for many to realize that we are in the midst of a major revolution in highway engineering techniques. Much has been done with aerial methods of mapping, and photogrammetric methods have been developed over the past 15 years, until today such state highway departments as California and Ohio and a growing list of others are making systematic application of this money-saving, time-saving and engineer-saving tool. Specialized consultants are finding a swiftly expanding field for their services, particularly with respect to the complex urbanized highway problems.

Speakers at the conference reviewed this progress and brought it into new perspective, then went on to preview several new developments that will further and dramatically effect the work of every engineer and contractor. One is the existence of new, more accurate photogrammetric plotting and measuring devices. As pointed out by T. Abrams, an aerial survey operator, new first-order plotting machines have been developed which have a degree of accuracy that cannot be approached by the multiplex or Kelsh type plotters in use in the United States today. In these machines, aerial photos can be handled, with relatively little ground control, and measurements can be taken and set down so accurately that 1/10 ft. measurement of ground elevation and distance is routinely possible.

What this means is that photogrammetry, heretofore used mainly for reconnaissance maps, planimetric work,

and contours, now demands a new concept of thinking. Aerially produced profiles, cross-sections and quantity computations — taken before, during and after construction — are now obtainable with an accuracy never before possible from the ground, according to Abrams.

The second development, and the one which really stole the show at the Chicago conference, was the demonstration of present accomplishment and future possibilities of electronic computing. Many engineers have known of the California application of electronic calculators in the drafting room, as reported by Osofsky and others. The instrument makers present at the conference, demonstrated their latest devices and said they were already at work on equipment that would further mechanize and improve aerial methods. A trained technician, by manipulating electronically controlled protractors accurate to one part in 30,000 for example, might take various offset readings, punch them out on a tape or punch card and get answers to various problems in a fraction of the time formerly required.

The spirit of the conference, in the words of chairman Foster of Michigan, Ridge of the Bureau and others, was one of "imaginative dreaming." This meeting is sure to make itself felt increasingly in every highway department, and in municipal departments too. To mention just one minor working aspect, cross-sections being no longer laborious can be more frequently spaced. Beyond that, location studies can be made more freely, since the time and manpower required will be lessened. Cross-section sheets with their laborious drafting may disappear from the scene, and contractors after some hesitancy will come to welcome the new quantity computing methods as basis for payments.

The changes won't come all at once. The equipment makers have long and costly research ahead of them. But the problem of every engineer today is to be young enough in mind to grasp and help utilize the new methods when and as they become available. Administrators must be prepared to launch training programs for personnel and to adapt their organizational setups. Smaller agencies including some counties and cities will lean more on specialized services and may band together increasingly to utilize high-installation-cost equipment for ultimate economy.

Briefly Noted . . .

The Oklahoma highway department has just completed a test road, as ordered by the state legislature, to compare the virtues of asphalt and concrete. It was patterned after a similar project built four or five years ago in Indiana, in that concrete and asphalt are each represented by a section several miles in length, designed in accordance with the ideas of the respective material associations. The highway will be thrown open to normal traffic, and reports made periodically to the legislature on the comparative maintenance cost and condition.

There is much to say for such test projects, where normal rather than accelerated load repetitions are involved. In this respect these projects are in contrast with the big AASHO accelerated road test project now getting under way. But the AASHO project in Illinois too will pit asphalt against concrete. How can anyone hope to see a calm and objective publicity for the eventual results, when such adversaries are thrown together in the arena?

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS

Roads and Streets in the News

On State Legislative Front

● **ARIZONA:** State Highway Engineer William E. Willey announced that a \$412,000,000 program to bring Arizona highways and roads up to federal standards over the next 10 years was recommended to a state highway study committee. His office called for expenditures totaling a record \$20,000,000 for new highway construction during 1956-57.

Meanwhile, the Arizona legislature up to this writing had failed to act on Governor McFarland's recommendation for an increase of 1 cent in the state gasoline tax, from 5 to 6 cents a gallon.

● **ARKANSAS:** Army Engineers have approved a bridge across the Mississippi River south of Helena, Ark., and the consulting engineers plan to have the complete design and specifications ready for bidding by Oct. 1 or sooner.

Arkansas chief highway Engineer Ward Goodman said it would take two or three months thereafter to complete financial arrangements and another month or six weeks to get the work under contract. The Arkansas highway department contemplates putting up the job for bidding in advance of financing to determine just how much revenue bond proceeds would be needed to construct the bridge.

Past construction cost estimates have ranged from \$7,500,000 to nearly \$10,000,000. Under the financing plans, Mississippi will make a direct contribution of \$1,000,000 and Arkansas \$2,000,000, with Arkansas then issuing revenue bonds for the balance. The highway departments of the two states also are committed to build approach roads to the bridge, which would tie in with Highway 20 in Arkansas and Highway 61 in Mississippi.

● **CONNECTICUT:** A second \$100,000,000 series of bonds for the \$398,000,000 Connecticut toll expressway, being constructed from the New York state line at Greenwich to the Rhode Island line at Killingly, has been sold.

An initial \$100,000,000 bond issue, to finance preliminary stages of the project, was marketed in May, 1954. Bonds for the 129-mile pike, scheduled for completion by the end of

1957, are backed by both tolls and state gasoline tax revenues.

● **FLORIDA:** The Duval County Expressway Authority was informed that a final report on traffic surveys on the feasibility of completing its \$65,000,000 roadway system was expected to be ready early in April.

Sale of bonds to finance completion of the project will thus be delayed at least until some time in May. It has been indicated the bond offering will include approximately \$28,000,000 to pay off an original 1949 issue and about \$36,000,000 to complete the project.

The State Road Board adopted a six-month budget of \$141,521,400 for primary, secondary and bond projects, which includes work proposed and in progress. Of the total, about \$40,000,000 is federal money and \$25,000,000 bond money.

● **INDIANA:** State Budget Director Donald H. Clark predicted that the 1957 Indiana legislature will be asked to boost the state gasoline tax from 4 to 6 cents a gallon to provide \$30,000,000 in additional annual revenue for matching federal aid. Revenue from the present tax, he said, is insufficient to permit the state to match federal funds currently available to the state.

● **KANSAS:** State Turnpike Authority was informed following engineering studies that a proposed Kansas Turnpike extension from Wichita to Hays, via Hutchinson and Great Bend, would not be feasible at present.

George Burpee, traffic engineer for Coverdale & Colpitts, New York, reported estimated revenues for such an extension "fall far short" of the amount that would be needed to amortize construction costs. Josef Sorokin of Howard, Needles, Tammen & Bergendoff, Kansas City, estimated the cost of the projected 134.6-mile extension would be \$94,000,000.

Burpee said the feasibility study indicated potential revenue from the route in its first year of operation would be \$2,066,000, as against the \$4,245,000 that would be needed to pay the cost of operation and to meet required interest and bond payments. He said the segment between Wichita and Hutchinson had a "somewhat

brighter" prospect, "although not considered feasible at this time." This 46-mile section was estimated to cost \$33,000,000. Its estimated first-year revenues would be \$947,600, but \$1,520,000 would be required.

● **KENTUCKY:** Bond issues Governor Chandler is expected to recommend to a spring special session of the Kentucky legislature include \$200,000,000 for highway construction, if sufficient federal funds are made available by the federal government to match this amount at \$9 for each state dollar.

● **KENTUCKY:** A resolution approved by the Kentucky Senate directed the State Legislative Research Commission and the State Highway Department to make a study of bridge and ferry tolls between Kentucky and Illinois, Indiana and Ohio.

● **MASSACHUSETTS:** Enactment of state legislation providing for the creation of a Massachusetts Port Authority, to consolidate key transportation facilities in Greater Boston under the ownership and management of a single self-supporting agency, was recommended by a special state legislative study commission.

The recommendation marked the second time such a special commission has, with Governor Herter's unqualified support, advocated such a port authority.

Among the transportation facilities recommended for inclusion in the proposed authority are the Port of Boston, Logan and Hanscom Airports, the Mystic River Bridge and the Sumner Tunnel.

To be patterned after the Port of New York Authority, the proposed agency would have as its first construction project a second vehicular crossing from downtown Boston to East Boston. Its acquisitions and activities would be financed entirely through the sale of revenue bonds, not backed by the state credit.

● **MICHIGAN:** Liberalization of bonding restrictions under Michigan's arterial highway construction act, to raise an additional \$200,000,000 for construction of four-lane divided highways, was recommended by Governor Williams in a special message to the state legislature.

Under present Michigan law only 50 per cent of the revenue from a 1½-cent gasoline tax increase enacted last

year for arterial highways can be used for bonding purposes and no bonds may be issued until July 1.

The governor urged the state highway commissioner be given immediate authority to issue bonds against the full amount of the revenue from the increased tax.

Williams said removal of the restrictions would make it possible to issue about \$400,000,000 in arterial highway construction bonds, twice as much as under the present law. The additional \$200,000,000 would provide 400 miles of divided highways in addition to the 455 miles programmed by the State Highway Department for the next two years, he estimated.

In another development, a proposal to increase Michigan highway funds through imposition of a ton-mile tax on heavy trucks was killed in a state legislative committee.

● **MICHIGAN:** Bills introduced in the Michigan legislature would broaden the powers of the State Turnpike Authority and provide state-backed bonds to aid in financing toll roads.

One of the bills would give the authority broad powers to proceed with construction and financing of toll roads anywhere in the state "if, in its judgment, there is need and necessity for the projects," and where they can successfully be built and financed. The authority is now limited to toll road projects between Rockwood and Saginaw and Detroit and Chicago.

Another proposal would put a \$300,000,000 state-backed bond issue before the electorate in November to aid in financing 500 miles of toll expressways from the Ohio line to Mackinac Straits and from Detroit to Chicago. Both measures were sponsored by Senator Haskell L. Nichols, Jackson Republican.

The turnpike agency said its contemplated system, costing an estimated total of \$600,000,000, would be self-liquidating and could be put in operation in five years. Authority Chairman George N. Higgins explained the agency was asking the state legislature to approve state-guaranteed bonds to cover part of the cost and revenue bonds to cover the rest.

In addition to the currently proposed 113-mile toll road from Saginaw to Rockwood, Higgins said, the authority is now asking to connect Rockwood with the Ohio turnpike 33 miles away; to provide a 198-mile road from Saginaw north to the Straits of Mackinac, and to provide a

170-mile expressway from Detroit to Chicago via Benton Harbor and New Buffalo. If the bond issue carries, Rockwood-Saginaw construction would start immediately and final traffic and civil engineering studies ordered for Saginaw to Mackinac and Detroit to Chicago.

● **OKLAHOMA:** Moving toward "package" financing of Oklahoma's three authorized additional toll highways, the Oklahoma Turnpike Authority entered into contracts for a full survey of the projected south route to Dallas and a resurvey of the southwest route.

The new steps will delay any additional Oklahoma toll highway financing until late fall.

Besides authorizing the two new studies, the authority also granted the engineering firm of Wilbur Smith and Associates permission to delay a recheck of figures on the projected north route to Wichita until Aug. 1. That is the date for completion of the two other studies.

The Smith firm previously had been scheduled to submit the recheck of figures on the north route early in March. The extension was granted after Smith told the authority that initial findings of a traffic resurvey on the route were less favorable than in 1954 when an original study was made.

Three new contracts were signed by the authority. One for \$35,000 called for Smith to make a resurvey of the southwest route to see if traffic and earning prospects on that route had improved since 1954. Smith also was given a \$90,000 contract for an initial study on the south route to Dallas.

The authority also awarded an \$87,000 contract for cost estimates, civil engineering and study and appraisals to DeLeuw, Cather & Co. This study will select the most feasible route and set a cost estimate for the Dallas route. The contract also calls for the DeLeuw, Cather firm to receive 1.9 per cent of the adjusted contract cost on the south route as a consulting engineering fee if the pike is constructed.

● **PENNSYLVANIA:** Plans of the Pennsylvania Tunnel Commission for October marketing of 30 to 40-year revenue bonds in an amount of \$20,000,000 to \$25,000,000 were announced by the Pittsburgh investment banking firm of Singer, Deane & Scribner, which serves as financial advisors to the commission.

The bonds will finance a 3,600-foot, two-tube tunnel linking the east-

ern and western sections of the Penn Lincoln Parkway serving Pittsburgh and suburban motorists. The project will be the first handled by the commission, which was set up in 1954.

The New Haven, Conn., engineering firm of Wilbur Smith and Associates was retained to make a traffic study of the project, with a report due in August. Construction is planned to start in the fall, with completion early in 1959.

● **TEXAS:** Shortage of structural steel may block completion of the Dallas-Fort Worth Toll Road by its target date of July 1, 1957, the Texas Turnpike Authority was informed. J. C. Dingwall, engineer-manager, said the work schedule was a strict one "and we will have to be lucky to meet it, especially because of the steel situation." He said slow deliveries to contractors might delay completion by as much as 30 to 60 days.

Authority Chairman Armistead Rust pointed out, however, it was primarily a worry of the contractors, since they have specified completion dates with penalties for tardiness.

Contract awards up to late February put 71 per cent of the 30-mile project under contract in the matter of dollar costs, and distance-wise, the entire length except for paving contracts to come later. Contracts now have been let for all of the grading, small drainage structures and bridges, he said, with bids to be called in March on 10½ miles of paving on a section north of Arlington.

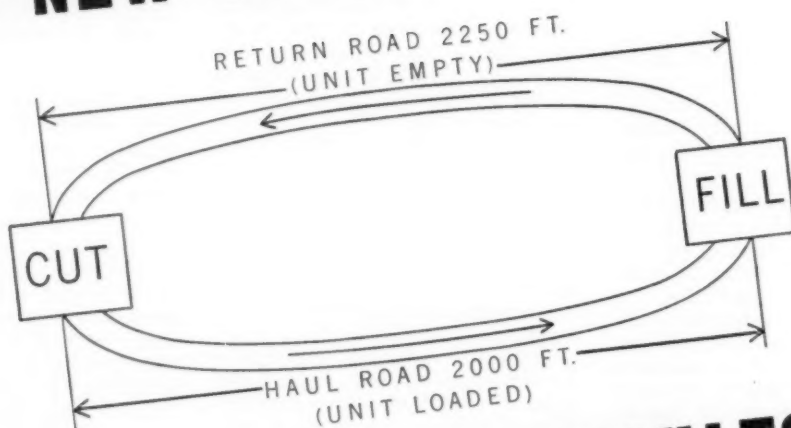
Tunnels through Rockies found not feasible

The possibility of early construction of a tunnel through one or more of the mountain passes under the Continental Divide dwindled when the Colorado Highway Commission ruled out the present feasibility.

Reports were submitted by Singstad and Baillie of New York, tunnel specialists, and by Howard, Needles, Tammen and Bergendoff, consulting engineers on the economies. Adverse findings were given for proposed tunnel sites at Straight Creek, Vasquez Pass, Berthoud Pass, and Whiskey Creek Pass in connection with U. S. 6 and 40 and related routes.

The Highway Commission will plan third-laning and other improvements to the present high-elevation pass roads, in lieu of the tunnels which would have cost sums varying from \$19 million to \$52.8 million each.

CONTRACTOR COMPARES "EQUALLY RATED" SCRAPERS ON JOB IN NEW JERSEY



HERE ARE THE RESULTS

CAT* DW21-NO. 470 LOWBOWL SCRAPER		SCRAPER-UNIT A
Average load in bank cu. yd. . . .	18.0	16.5
Total average cycle time on 4250-foot round trip	4.77 min.	5.28 min.
Trips per hour	12.6	11.3
<u>Production, bank cu. yd./hour</u>	<u>227</u>	<u>187</u>

LOWBOWL ADVANTAGE: 40 BANK CU. YD. AN HOUR

CAT LOWBOWL SCRAPER

OUTLOADS COMPETITION AGAIN!

Last October, when another wheel unit was needed for Thomas M. Durkin and Sons Co.'s job near Mantua, New Jersey, a new Cat DW21-No. 470 Lowbowl Scraper was matched against a new "equally rated" scraper-unit. In this test, as in other on-the-job tests under actual working conditions, the Caterpillar unit definitely outproduced competition. As a result, the company purchased the DW21-No. 470—as well as a D9 pusher.

Details of on-the-job comparison!

JOB DESCRIPTION: Thomas M. Durkin and Sons Co. has a project near Mantua, New Jersey, preparing building sites, constructing streets, etc., for a 1000-home development. The company needed another wheel unit for its spread to make possible full pusher efficiency. To get a direct comparison of production, a new Cat DW21-No. 470 Lowbowl Scraper and an "equally rated" new 2-wheel scraper-unit were pitted against each other on the job under identical conditions. Here's some basic data on the units:

	DW21-No. 470	Scraper-unit A
Rated capacity, struck	18 cu. yd.	18 cu. yd.
heaped	25 cu. yd.	24 cu. yd.
Net weight	57,320 lb.	68,400 lb.
Engine horsepower rating	300	300
Scraper operation	Cable	Hydraulic

A Caterpillar D9 torque-converter Tractor and "Tractor A" were demonstrated as pushers, the D9 push-loading the DW21-No. 470 and "Tractor A" push-loading Scraper-unit A.

CONDITIONS: Material—sand with some clay; density 2700 lb./cu. yd., very low swell. Loading—level cut, sand loose but not completely "dead." Average haul distance—2000 feet. Average return distance—2250 feet. Haul grades—200

feet, 4% average upgrade; 500 feet, negligible grade; 1300 feet, 3% average downgrade. Travel road—fair; packed sand.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

TIME STUDY DATA:

	DW21-No. 470	Scraper-unit A
Average loading time, min.	.59	.63
Average haul, dump, return time, min.	3.88	4.35
Total no-delay cycle time	4.47	4.98
Waits and delays, averaged between units to facilitate comparison	.30	.30
Total cycle time, min.	4.77	5.28
Average load, bank cu. yd.	18	16.5
Trips per hour	12.6	11.3
Production, bank cu. yd./hour	227	187

REMARKS: The excellent loading characteristics of the Lowbowl Scraper, plus its fast pumping cable operation, gave the No. 470 a clean-cut advantage over hydraulically operated Scraper-unit A. The DW21, with its efficient power train, made more than one extra trip an hour on the 4250-foot haul and return. Though grades were light, they slowed down Scraper-unit A, while the DW21-No. 470 took them in stride. Result: the DW21-No. 470 handled an average of 1.5 more bank cu. yd. a trip than Scraper-unit A—or the equivalent of 400 more a 10-hour day!



The new two-wheel Cat DW21-No. 470 Lowbowl Scraper

A new four-wheel DW20-No. 456 Lowbowl Scraper is also available. Both units feature the new Turbocharged 6-cylinder Caterpillar Engine which delivers 300 HP at 1800 RPM and 10% more rimpull. New Lowbowl design loads more material with less resistance clear to the end of the loading cycle. All these and other new features add up to bigger, faster loads for you with Cat Lowbowl Scrapers.

... for more details circle 194, page 16

CATERPILLAR*

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**BIGGER, FASTER
LOADS WITH CAT
LOWBOWL SCRAPERS**



● Pier girder sections, erected on three T piers which have been braced and are ready for interposing middle girders, shown on barge awaiting erection by derrick boat.

Floating Rigs, High-Strength Bolts

TIME was saved in erecting the Great Egg Bay Bridge, in New Jersey, by foregoing the use of a traveler and falsework in putting up heavy girder and beam spans. All the sections were set by a derrick

boat having a 75-ton capacity stiff-leg derrick with 43-ft. mast and 90-ft. boom.

Further erection time was saved by the use of high-strength bolts as field fasteners of beam spans, 4,600 bolts

being used in the structure. Lying just west of Ocean City, N. J., the bridge was the last of the 282 bridges to be completed on the \$300,000,000 Garden State Parkway.

The method was first to erect the short pier girder sections, most of which were 56 ft. long. These (with their cross frames, lateral bracing, and floor beams) were balanced on rocker or fixed shoes upon the concrete T piers and were temporarily braced with $\frac{3}{4}$ -in. diameter wire rope guys with turnbuckles. At the base of the piers the guys were attached to a rectangular steel frame which enveloped the pier. This frame obviated complications of guy anchors.

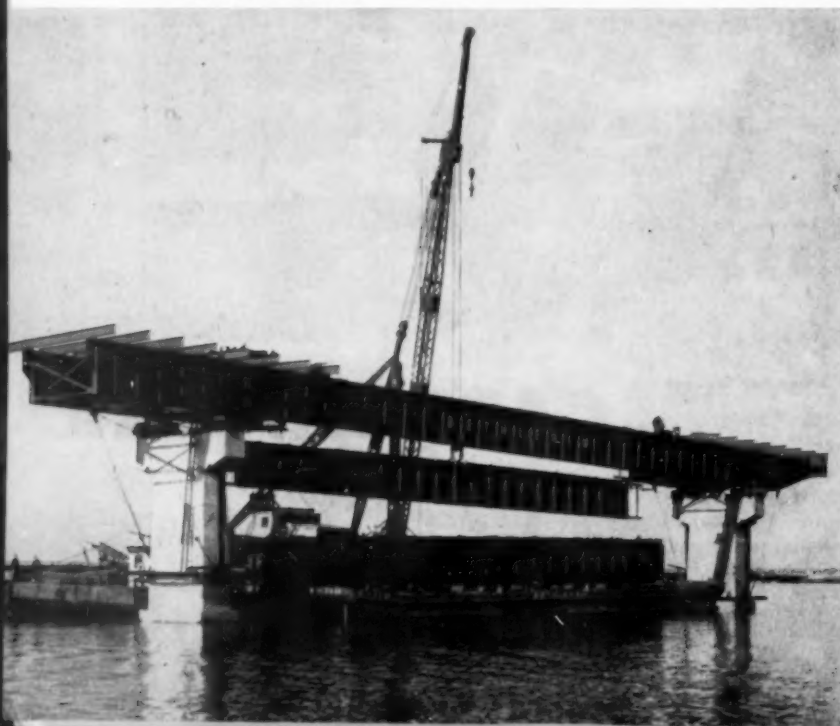
Steel Columns Were Used

On each end of the pier a steel column was used under the pier cap to prevent the bracing frame from rising. Since the pier caps have sloping surfaces on the under side, a short section of WF beam was used with two $1\frac{1}{2}$ in. diam. tie rods 18 ft. long to hold the columns in place.

Before erection of the 128-ft. middle girders, the pier girders were adjusted to the proper slope so that side entry of the middle girders into the splice was possible. When both middle girders were in place and pinned and bolted to make them continuous between piers, the bracing and floor steel were erected.

The girders are 9 ft. deep. The

● Erection of the next-to-last pair of middle girders, weighing 63 tons apiece. Girder 128 ft. long is being hoisted into place, where it will be fastened to stub ends of pier girder sections on far side of piers. Lift was made by 75-ton capacity stiffleg derrick.





● General view of completed Great Egg Bay Bridge, with its 2,730 ft. of structural steelwork. It is part of 165 miles of parkway operated by New Jersey Highway Authority.

Cut Girder Bridge Erection Time

heaviest hoisted by the derrick boat weighed 63 tons. The piers range in height from 26 to 45 ft. above mean water.

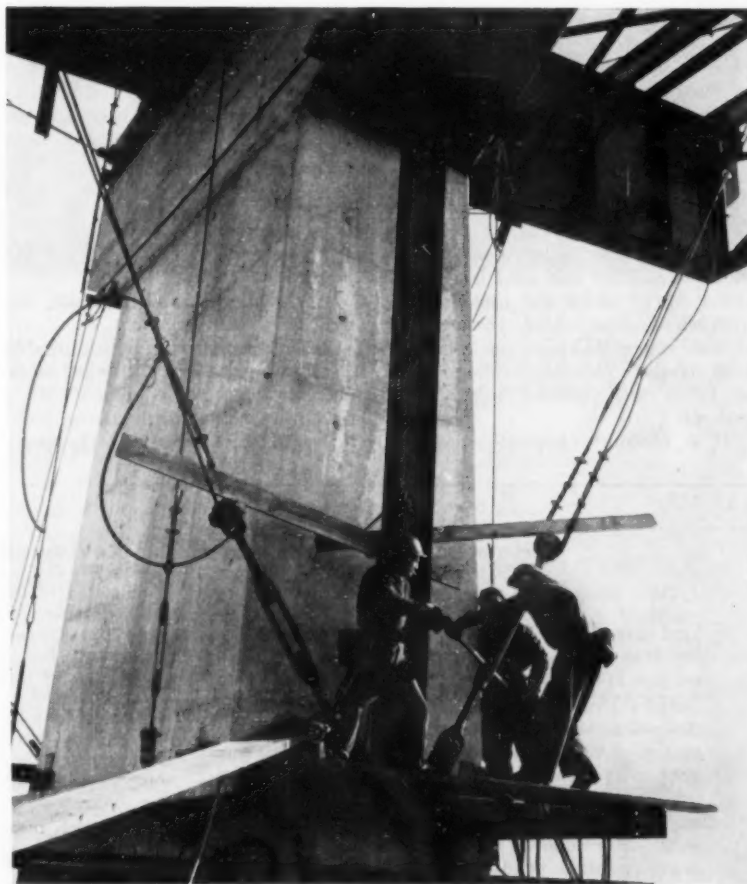
A second lighter derrick boat was used to set up the bracing frames on the piers. This boat had a 16-ton stillleg derrick with 24-ft. mast and 70-ft boom.

The steelwork, 2,730 ft. long, totaling 2,500 tons, also included 14 beam spans. With a concrete viaduct at each end the bridge extends 3,671 ft. from the south abutment on Beesley's Point to Drag Island. A third stretch of concrete viaduct 762 ft. long connects Drag Island with Somers Point on the north shore of the bay.

The steelwork was erected by Bethlehem Steel Company's Eastern Erection District under G. P. Bullard, manager of erection. At the site, John Piper was field engineer for Bethlehem, C. W. Leatherman superintendent, and James Richardson field supervisor.

Control of access

Legislatures in six states this year are considering new laws to control highway access, or amendments to existing laws, a survey by the National Highway Users Conference reveals. This is the so-called "off year" for state legislation, only 17 states are to meet in regular or budget sessions.



● Close-up showing bracing frame enveloping pier. Bethlehem Steel bridge-men are tightening turnbuckle of wire rope guy which braces pier girder section during erection procedure.



- Every move that these men make must be the "right" way and not the "wrong" way when they are handling explosives.

THE prevention of accidents in the use of explosives is a result of careful planning and observance of the best known practices. The explosives user must remember that he is dealing with a powerful force and that various devices and methods have been developed to assist him in directing this force. He should realize that this force, if misdirected, may either kill or injure both him and his fellow workers.

All explosives are dangerous and must be handled and used with care either by or under the direction of competent experienced persons. It is the responsibility of all persons who handle explosives to know and to follow all approved safety procedures.

It is obviously impossible to in-

clude warnings or approved methods for every conceivable situation.

Additional information is available in various Institute of Makers of Explosives Publications.

Meanings of terms...

1. The term "explosives" as used herein includes any or all of the following: Dynamite, black blasting powder, pellet powder, blasting caps, electric blasting caps, and detonating fuse.
2. The term "electric blasting cap" as used herein includes both instantaneous electric blasting caps and all types of delay electric blasting caps.
3. The term "Primer" as used herein means a cartridge of explosives in combination with a blasting cap or an electric blasting cap.

When transporting explosives...

1. *Do* obey all federal, state, and local laws and regulations.
2. *Do* see that any vehicle used to transport explosives is in proper working condition and equipped with a tight wooden or non-sparking metal floor with sides and ends high enough

to prevent the explosives from falling off. The load in an open-bodied truck should be covered with a waterproof and fire-resistant tarpaulin. Wiring should be fully insulated so as to prevent short circuiting, and at least two fire extinguishers should be carried. The truck should be plainly marked so as to give adequate warning to the public of the nature of the cargo.

3. *Don't* permit metal, except approved metal truck bodies, to contact cases of explosives. Metal, flammable, or corrosive substances should not be transported with explosives.
4. *Don't* allow smoking or unauthorized persons in the vehicle.
5. *Do* load and unload explosives carefully.
6. *Do* see that other explosives are separated from blasting caps and/or electric blasting caps where it is permitted to transport them in the same vehicle.

When storing explosives...

7. *Do* store explosives in accordance with federal, state, or local laws.
8. *Do* store explosives only in a magazine which is clean, dry, well ventilated, reasonably cool, properly located, substantially constructed, bullet and fire resistant, and locked.

(Continued on page 68)

How Long Since Your Staff Has Reviewed These Rules?

Those familiar little leaflets of instruction and warning, contained in every case of blasting cartridges, are less hard to read now. The working rules printed formerly in fine type have been dressed up for easier reading for the men in the field.

And the rules themselves have been rewritten so that they tell a clearer and more logical story. Entitled "Prevention of Accidents in the Use of Explosives," the pamphlet today represents a revision approved by the Institute of Makers of Explosives, September 30, 1955, and only recently made available in printed form. The pamphlet was called to the Editor's attention by Atlas Powder Company, whose offices will be only too glad to furnish copies to anyone interested.

Because of the rapidly growing volume of explosives being employed in roadbuilding and construction, **ROADS AND STREETS** herewith reproduces, with minor abridgements, the text and illustrations of this pamphlet. While the pamphlet will be widely circulated through trade and distribution channels, the Editors feel that the rules all too often have been merely glanced at, when they should be carefully reviewed at frequent intervals, and repeatedly brought to the attention of all personnel involved in any way with blasting.

With blasting as with any phase of job management, explicit job procedures must be constantly and closely supervised, in order that each man knows what is expected of him, how to play his part — and, in this case, what will happen if laxity is allowed to prevail.—*Editors.*



End excessive road repairs

Stabilize your roads with Morton Salt

- Cut aggregate loss ● Save man-hours and maintenance money ● Reduce accidents caused by loose gravel



Send for this free book on how Morton Salt helps you build better roads at far less cost! Mail this coupon today!

Gravel roads stabilized with Morton Salt give more service per dollar than roads built by any other method. (Savings in aggregate alone more than pay for the salt.) You get smooth, durable, water-repellent surfaces that require minimum maintenance.

Stabilizing the base course of primary roads with Morton Salt helps prevent the 9 out of 10 road failures which result from faulty foundations.

... for more details circle 243, page 16

ROADS AND STREETS, April, 1956

Please send me your free booklet
on salt stabilized roads.

Name _____ PLEASE PRINT

Title _____

Address _____

City _____ County _____ State _____

**MORTON SALT
COMPANY**
INDUSTRIAL DIVISION

Dept. RS-4 120 So. La Salle Street,
Chicago 3, Illinois





F-100 8-ft. Pickup—GVW 5,000 lbs.

T-800—GVW 42,000 lbs.; GCW 65,000 lbs.

FORD BIG JOBS can mean

FORD EXPERIENCE IN HEAVY DUTY ENGINES PAYS OFF...

- Much longer peak engine performance!
- Much less DOWN TIME on the job!

Ford Trucks for '56 save you money right from the start. And, they keep on saving with their extra-sturdy, long-life engine design.

For instance... Ford Engineers have now introduced into all heavy-duty engines the greatest valve advancements ever. As an example, see the exhaust valve in diagram on right page. The valve stem is hollow and partially filled with powdered sodium. When the sodium gets hot, it *turns into a liquid*. As it moves up and down, it carries heat away from valve head—*allows it to operate up to 225° cooler!* Result: a cleaner-running, more burn-free, longer-lived valve face.

Ford's long-lasting engine design pays off for you in every way. You save money on parts replacements such as piston rings and bearings. You save on shop labor—extend time between preventive maintenance jobs like valve adjustments, valve grindings, compression tests, ring jobs and the like.

And you can save on driver costs if you can keep trucks out of the shop and on the road. Yes, you save in every way when you get more work done per truck!

There's a Ford Truck for every trucking job. Before you buy your next truck, Test Drive a Ford Economy Truck.

FORD TRUCKS LAST LONGER

Certified by independent insurance actuaries for the ninth consecutive year! Studies of over 10,068,600 current license registrations show that Ford Trucks last up to 9.9% longer than any of the other 4 leading truck makes!



F-900—GVW 29,000 lbs.; GCW 60,000 lbs.

BIG SAVINGS in your business

Hauls up to 3000 lbs. more than other 6-wheelers—New Ford T-800

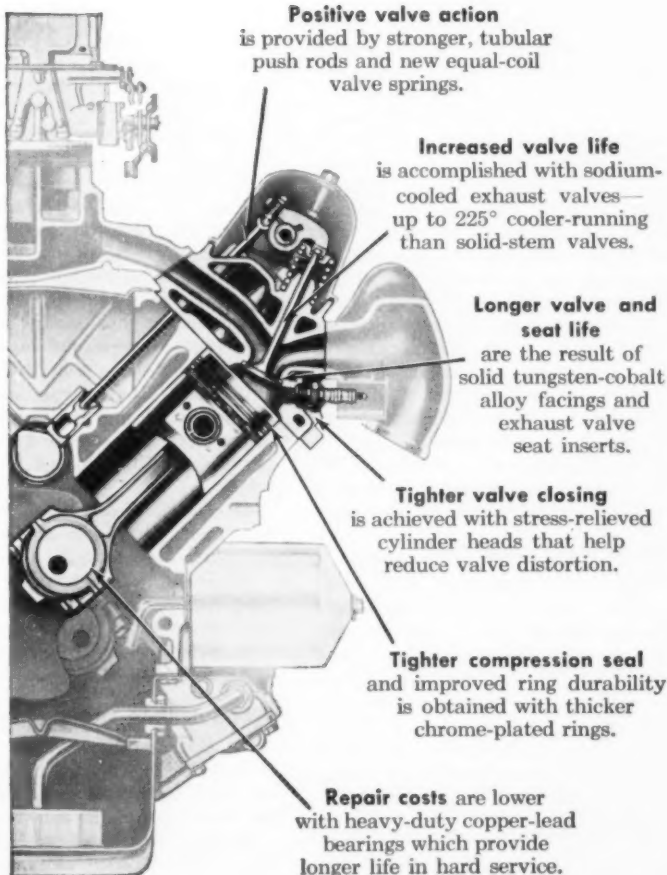
● New power and hauling capacity of the Ford Tandem BIG JOB cuts hauling time on every run—makes giant cargos seem lightweight. You have a choice of two gas-saving Short Stroke engines. Either the 190-h.p. *Torque King V-8* or, the 200-h.p. *Torque King Special V-8*.

You have new engine advancements for longer life (some explained and illustrated at the right).

New high-capacity tubeless tires, heavy-duty 5-speed transmission and Power Steering are standard equipment, at no extra cost. Two 3-speed auxiliary transmissions and full-air brakes are available at low extra cost.

New *Driverized Cabs* for driving comfort and convenience have *Lifeguard Design* safety features found in no other truck. Lifeguard steering wheel helps protect driver from steering column; Lifeguard door latches help keep doors from jarring open in case of accident.

... for more details circle 280, page 16



Positive valve action is provided by stronger, tubular push rods and new equal-coil valve springs.

Increased valve life is accomplished with sodium-cooled exhaust valves—up to 225° cooler-running than solid-stem valves.

Longer valve and seat life are the result of solid tungsten-cobalt alloy facings and exhaust valve seat inserts.

Tighter valve closing is achieved with stress-relieved cylinder heads that help reduce valve distortion.

Tighter compression seal and improved ring durability is obtained with thicker chrome-plated rings.

Repair costs are lower with heavy-duty copper-lead bearings which provide longer life in hard service.



● This blast, one of many required on the S. J. Groves & Sons, Inc., project on the Massachusetts Turnpike — part of a blasting program in which this contractor observed safety rules under the eye of an experienced blasting foreman and a vigilant superintendent. (Roads & Streets photo)

(Continued from page 64)

9. *Don't* store blasting caps, electric blasting caps, or primers in the same box, or magazine with other explosives.

10. *Don't* store explosives, fuse, or fuse lighters in a wet or damp place, or near oil, gasoline, cleaning solutions or solvents, or near radiators, steam pipes, stoves, or other heat.

11. *Don't* store any sparking metal, or sparking metal tools in an explosives magazine.

12. *Don't* smoke or have matches, open lights, or other fire or flame in or near an explosives magazine.

13. *Don't* allow leaves, grass, brush, or debris to accumulate within 25 feet of an explosives magazine.

14. *Don't* shoot into explosives or allow the discharge of firearms in the vicinity of an explosives magazine.

15. *Do* consult the manufacturer if nitroglycerin from deteriorated explosives has leaked onto the floor of a magazine. The floor should be desensitized by washing thoroughly with an agent approved for that purpose.

When using explosives...

16. *Don't* use sparking metal tools to open kegs or wooden cases of explosives. Metallic slitters may be used for opening fiberboard cases, provided that the metallic slitter does not come in contact with the metallic fasteners of the case.

17. *Don't* smoke or have matches, open lights, or other fire or flame nearby while handling or using explosives.

18. *Don't* place explosives where they may be exposed to flame, ex-

cessive heat, sparks, or impact.

19. *Do* replace or close the cover of explosives cases or packages after using.

20. *Don't* carry explosives in the pockets of your clothing or elsewhere on your person.

21. *Don't* make up primers in a magazine, or near excessive quantities of explosives, or in excess of immediate needs.

22. *Don't* insert anything but fuse in the opening end of a blasting cap.

23. *Don't* strike, tamper with, or attempt to remove or investigate the contents of a blasting cap or an electric blasting cap, or try to pull the wires out of an electric blasting cap.

24. *Don't* allow children or unauthorized or unnecessary persons to be present where explosives are being handled or used.

25. *Don't* handle, use, or be near explosives during the approach or progress of any electrical storm. All persons should retire to a place of safety.

26. *Don't* use explosives or blasting equipment that are obviously deteriorated or damaged.

27. *Don't* attempt to reclaim or use fuse, blasting caps, electric blasting caps, or any other explosives that have been water soaked, even if they have dried out. Consult the manufacturer.

When drilling and loading...

28. *Do* carefully examine the face or rock before drilling to determine the possible presence of unfired explosives. Never drill into explosives.

29. *Do* check the bore holes carefully with a wooden tamping pole or

measuring tape to determine its condition before loading.

30. *Don't* stack surplus explosives near working areas during loading.

31. *Do* cut from the spool the line of detonating fuse extending into a bore hole before loading the remainder of the charge.

32. *Don't* load a bore hole with explosives after springing (enlarging the hole with explosives) or upon completion of drilling without making certain that it is cool and that it does not contain any hot metal, or burning or smoldering material. Temperatures in excess of 150° F. are dangerous.

33. *Don't* spring a bore hole near another hole loaded with explosives.

34. *Don't* force cartridges or any explosives into a bore hole or past any obstruction in a bore hole.

35. *Don't* force a blasting cap or an electric blasting cap into dynamite. Insert the cap into a hole made with a punch designed for the purpose.

36. *Don't* slit, drop, deform, or abuse the primer.

37. *Don't* connect blasting caps, or electric blasting caps to detonating fuse except by methods recommended by the manufacturer.

When tamping...

38. *Don't* tamp dynamite that has been removed from the cartridge.

39. *Don't* tamp with metallic devices of any kind. Use wood tamping tools with no exposed metal parts except non-sparking metal connectors for jointed poles. Avoid violent tamping. Never tamp the primer.

40. *Do* confine the explosives in the bore hole with sand, earth, clay, or other suitable incombustible stemming material.

41. *Don't* kink or injure fuse, or electric blasting cap wires, when tamping.

When shooting electrically...

42. *Don't* uncoil the wires or use electric blasting caps during dust storms or near any other source of large charges of static electricity.

43. *Don't* uncoil the wires or use electric blasting caps in the vicinity of radio-frequency transmitters except at safe distances. Consult the manufacturer or the Institute of Makers of Explosives pamphlet on "Radio Frequency Hazards."

44. *Do* keep the firing circuit completely insulated from the ground or other conductors such as bare wires, rails, pipes, or other paths of stray currents.

45. *Don't* have electric wires or cables of any kind near electric blasting caps or other explosives except at

the time and for the purpose of firing the blast.

46. *Do* test all electric blasting caps, either singly or when connected in a circuit, using only a blasting galvanometer specifically designed for the purpose.

47. *Don't* use in the same circuit either electric blasting caps made by more than one manufacturer, or electric blasting caps of different style or function even if made by the same manufacturer, unless such use is approved by the manufacturer.

48. *Don't* attempt to fire a circuit of electric blasting caps with less than the minimum current specified by the manufacturer.

49. *Do* be sure that all wire ends to be connected are bright and clean.

50. *Do* keep the electric cap wires or leading wires short circuited until ready to fire.

When shooting with fuse...

51. *Do* handle fuse carefully to avoid damaging the covering. In cold weather warm slightly before using to avoid cracking the waterproofing.

52. *Don't* use short fuse. Never use less than two feet. Know the burning speed of the fuse and make sure you have time to reach a place of safety.

53. *Don't* cut fuse until you are ready to insert it into a blasting cap. Cut off an inch or two to insure a dry end. Cut fuse squarely across with a clean sharp blade. Seat the fuse lightly against the cap charge and avoid twisting after it is in place.

54. *Don't* crimp blasting caps by any means except a cap crimper designed for the purpose. Make certain that the cap is securely crimped to the fuse.

55. *Do* light fuse with a fuse lighter designed for the purpose. If a match is used the fuse should be slit at the end and the match head held in the slit against the powder core. Then scratch the match head with an abrasive surface to light the fuse.

56. *Don't* light fuse until sufficient stemming has been placed over the explosive to prevent sparks or flying match heads from coming into contact with the explosive.

57. *Don't* hold explosives in the hands when lighting fuse.

In underground work...

58. *Do* use permissible explosives only in the manner specified by the United States Bureau of Mines.

59. *Don't* take excessive quantities of explosives into a mine at any one time.

60. *Don't* use black blasting powder or pellet powder with permissible ex-

plosives or other dynamite in the same bore hole in a coal mine.

Before and after firing...

61. *Don't* fire a blast without a positive signal from the one in charge, who has made certain that all surplus explosives are in a safe place, all persons and vehicles are at a safe distance or under sufficient cover, and that adequate warning has been given.

62. *Don't* return to the area of any blast until the smoke and fumes from the blast have been dissipated.

63. *Don't* attempt to investigate a misfire too soon. Follow recognized rules and regulations, or if no rules or regulations are in effect, wait at least one hour.

64. *Don't* drill, bore, or pick out a charge of explosives that has misfired. Misfires should be handled only by or under the direction of a competent and experienced person.

Explosives disposal...

65. *Don't* abandon any explosives.

66. *Do* dispose of or destroy explosives in strict accordance with approved methods. Consult the manufacturer or follow the Institute of Makers of Explosives pamphlet on destroying explosives.

67. *Don't* leave explosives, empty cartridges, boxes, liners, or other materials used in the packing of explosives lying around where children or unauthorized persons or livestock can get at them.

68. *Don't* allow any wood, paper, or fiber materials employed in packing explosives to be burned in a stove, fireplace, or other confined space, or to be used for any purpose.

Such materials should be destroyed by burning at an isolated location out of doors and no person should be nearer than 100 feet after the burning has started.

Minimizing Poisonous Gas Hazards from Explosives

1. Use the largest diameter cartridge of explosive that is consistent with the work to be done.
2. *Don't* use explosives that are obviously deteriorated or damaged.
3. Explosives should not be removed from the cartridges.
4. *Do not* overcharge.
5. *Do not* add paper, or other combustible material, to the charge.
6. Avoid all conditions that may cause burning rather than detonation of the explosives.
7. In wet work always use explosives having adequate water resistance and fire the blast as soon after loading as practicable.
8. Confine the charge with incombustible stemming.
9. Provide adequate ventilation and make sure that the air is directed to the working places.
10. Make frequent tests to be sure that the air used for ventilation is free from carbon monoxide or other dangerous gases.
11. Spray the muck pile with water.
12. Allow the maximum practicable time after blasting before returning to the face.

Using cap and fuses:

(See sketches next page)

Priming: When blasting caps are used, the proper length of fuse should be cut from the roll and the blasting cap crimped to the fresh cut end of the fuse with a cap crimper, not with a knife or with the teeth. Be sure that the fuse is cut squarely across and that the end is pushed gently against the explosive material in the blasting cap. Do not twist the fuse inside the cap. The crimp in the blasting cap should be made near the end through which the fuse enters. In wet work, use a water-proof crimp or waterproof joint between fuse and cap.

In making up primers by the side priming method shown in Fig. 1, punch a hole about the size of a lead pencil in the side of the cartridge. This hole should be a little deeper than the length of the blasting cap and should be directed downward as shown rather than across the cartridge. Insert the blasting cap and fasten the fuse securely to the dynamite cartridge to prevent cap and fuse being pulled out of cartridge.

In using the lacing method shown in Fig. 2 it is necessary to punch two diagonal holes as shown. The upper one goes completely through the cartridge and the lower one a little deeper than the length of the cap. The capped fuse is then threaded through the upper hole and the cap inserted to the bottom of the lower hole. Avoid sharp bends or kinks in the fuse.

These instructions and warnings are not to be construed as superseding federal, state, corporation or municipal laws, ordinances or regulations. Particular attention is called to the fact that permissible explosives are not permissible unless they are used in the manner specified by the United States Bureau of Mines.

PROPER WAYS TO MAKE A PRIMER

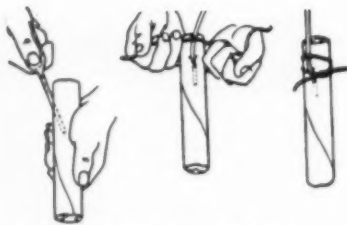


Figure 1. Side Priming

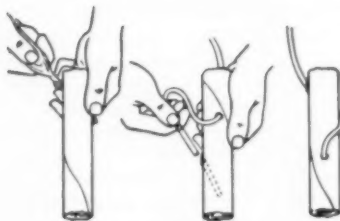


Figure 2. Lacing

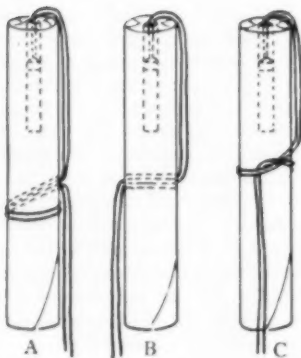


Figure 3.

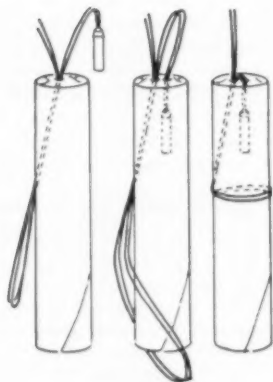


Figure 4.

Electric blasting caps:

(See also previous page)

When electric blasting caps are used for priming cartridges two inches or less in diameter, one of the three methods shown in Fig. 3 should be employed.

In the first method (A), punch the hole diagonally through the cartridge below the center. Fold over the wires about six inches from the cap to form a sharp bend. Then push the folded wires through the hole.

Open the folded wires and pass the loop over the near end of the cartridge. Punch another hole straight into the opposite end of the cartridge, insert the electric blasting cap in this hole, and take up all slack in the wires.

In the second method (B), punch one hole horizontally through the cartridge at or slightly below the center and another straight into the far end. Push the cap first through the horizontal hole, then into the other hole, and take up the slack in the wires.

In the third method (C), punch a hole straight into one end of the cartridge. Insert the cap into the hole, and half-hitch the wires around the center of the cartridge. Do not hitch the wires too tightly as the strain may break them or injure the insulation.

When electric blasting caps are used for priming cartridges over two inches in diameter, punch a slanting hole from the center of one end of the cartridge coming out through the side about two or more inches from the end. Fold over the wires about twelve inches from the electric blasting cap to form a sharp bend. Then push the folded wires through the hole, starting at the end of the cartridge and coming out through the side.

Open the folded wires and pass the loop over the other end of the cartridge. Punch another hole straight into the end of the cartridge beside the first, insert electric blasting cap in this hole and take up all slack in the wires, as illustrated in Fig. 4.

When delay electric blasting caps are used, the cartridge should be punched deeper to take care of the longer shell.

Otherwise the priming process is the same as with electric blasting caps.

CAA reorganization recommended

The senate aviation subcommittee recently made public over the strong objections of the commerce department a long secret report recommending a drastic overhaul in the civil aeronautics administration.

Louis Rothschild, commerce under-secretary, told the senate subcommittee, that its release would work a "needless injury to morale." Included in report is a recommendation for taking 3,350 employees off CAA payroll.

The report, prepared by Cresap, McCormick and Paget, Chicago management engineers, recommends:

- That fiscal and compliance responsibilities of CAA in the federal aid airports program be transferred to the bureau of public roads.

- A three-level system of flight control which would consolidate the CAA's two categories of traffic control — the 26 air traffic control centers and the 169 airport towers — into 50 major terminal areas and would set up 8 new "express centers" to handle long distance traffic.

- Elimination of the CAA's interstate airways communications stations, as having "outlived their usefulness." Weather activities would be transferred to the weather bureau and functions reassigned within CAA.

- Basic reorganization of the CAA. The present regional administrative setup would be altered to channel responsibility from the CAA through a deputy to two "line executives" — the heads of federal airways and aviation safety — who would have direct responsibilities for all activities.

- Restriction of CAA's aviation safety activities to establish basic standards of aircraft performance, maintenance and repair, and operations.

The report estimates that the recommended changes would result in an annual payroll reduction of \$18 million. Of the total reduction in employees and payroll, about 1,100 persons and \$5 million in salaries would be needed in other areas of the commerce department with a net savings of approximately \$13 million.

According to the Associated Press, commerce officials have said that while the recommendations might bring "worthwhile savings," it may never be put into effect.

NEW...

**Bonus Powered
too!**



NEW

**124 Net Engine
Horsepower. In
International
Drott Machines,
Engine develops
134 Net
Horsepower.**

182 Series

**TD
18**

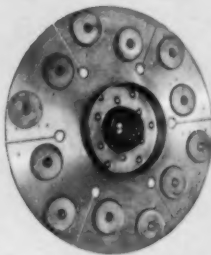


TD-18 diesel (series 182) delivers 103 drawbar horsepower, with weight of 29,050 pounds (without equipment). All-weather electric starting, standard equipment. "New look" visibility, operating ease never before available. New heavy-duty, swinging-door type radiator guard is "standard"—for carrying heavy front-mounted equipment. Gives big tractor performance in pioneering under roughest conditions. Powers 3-yard International Drott Skid-Shovel, anywhere.

No costly delay from a "killed" or cold engine—you start fast! Famous International gasoline-conversion diesel starting—actual "in-seat" starting—is standard equipment on this new crawler line. With "push-button" ease, you get seconds-fast starting, whether the engine is cold, or stopped! And you're on the job seconds-fast, when minutes are dollars.

Cermetalllic Engine Clutch Facings Save power, defy heat, prolong life! Uncomplicated, familiar-to-all engine clutch design of these new crawlers have power-holding, heat-defying, long-lasting Cermetalllic facings. These facings reduce lever-pull up to 50%, provide amazing heat immunity, add service freedom, cut upkeep!

New . . . 500-hour lube intervals with new metal-to-metal, track roller seals! You save the time and expense of frequent inspections or lubrications, with the new full-floating, cartridge-type, track roller seals provided on the TD-24, TD-18, and TD-14. These precision-lapped, metal-to-metal seals are so effective they give you safe 500-hour intervals between roller lubrications!

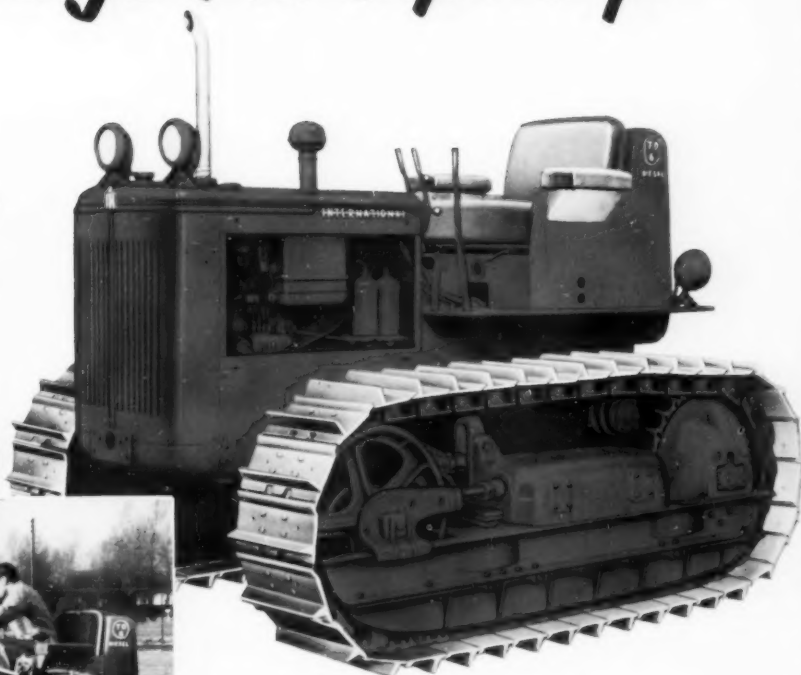


Steps up a size... in job range and capacity!

**50 Net Engine Horsepower.
In International Drott
Machines, Engine develops
55 Net Horsepower.**

61 Series

**TD
6**



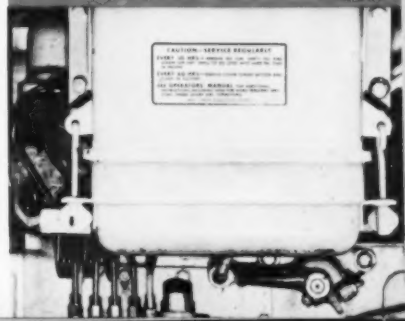
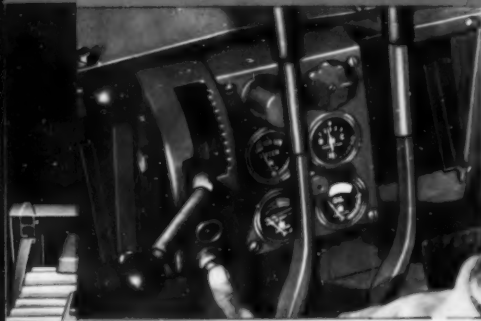
TD-6 diesel (series 61), 41.5 drawbar hp, up 23%! Steps up a whole size in work capacity and earning ability. Operating weight (5-roller model), without equipment, 8,890 pounds. Powers 1-yard International Drott Skid-Shovel or Four-In-One; serves as clean-up dozer unit on any-sized contract; versatility and low operating cost to do many sizes of jobs for every size of contractor.

Cent
ing
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**Full-view, one-glance panel
saves time—cuts effort!** One quick
glance at this new full-view panel,
with centralized instrument grouping,
gives the operator the instant check-
up, to assure that lubrication, genera-
tor, and cooling system are "perking"
for full production!

**New Fold-over Seat Aids Fast, Cen-
tralized Servicing!** New fold-over seat
of the TD-6 and TD-9 models allows op-
erator to give you the time and convenience
advantages of centralized steering clutch
assembly servicing. Lubricant fittings are
conveniently grouped and fully accessible!

**Thorough air filtration assured by new
under-hood cleaner!** Instead of being
"in your lap," or a knee-bumping obstruc-
tion, air cleaners of the new International
crawlers are side-mounted—for easy ac-
cessibility, yet out of the way. They have
big capacity and high efficiency, too, for
positive air filtration!

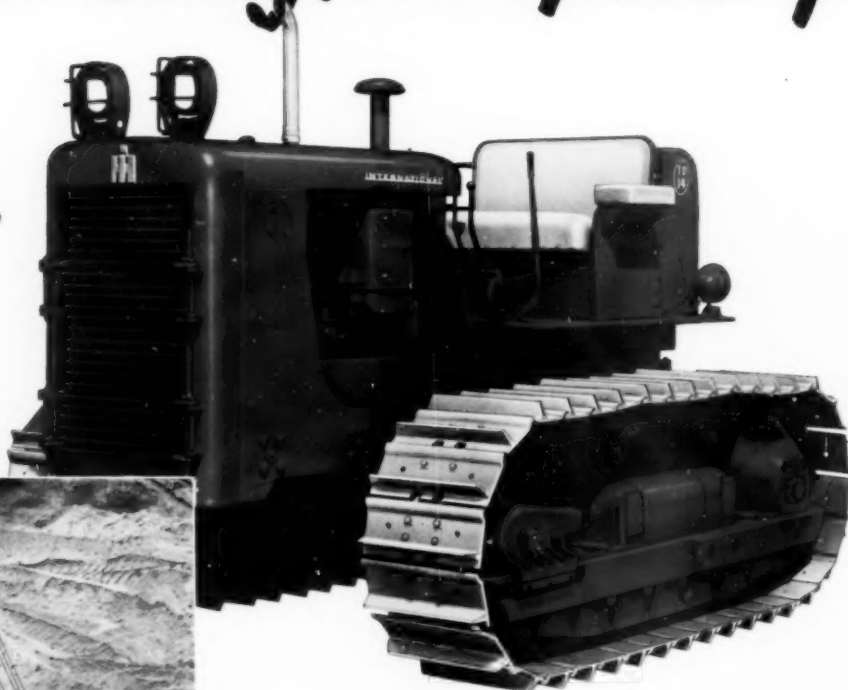


International Crawlers *give* *plus new design to speed you*

**95 Net Engine
Horsepower.**

142 Series

**TD
14**

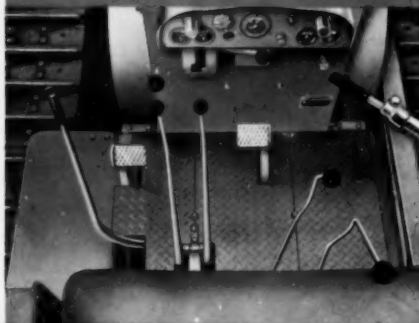
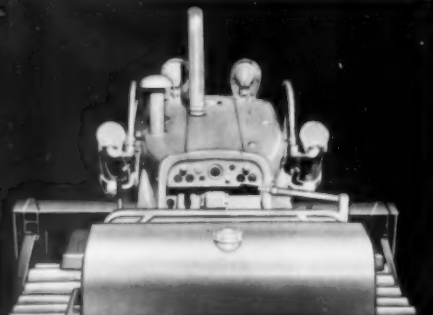


TD-14 (series 142), 78.5 drawbar hp; weighs 21,095 pounds (without equipment). Features "new look" engineering, job-speeding visibility, new equipment-carrying and operating strength. All-weather electric starting, standard equipment. It's a fast, responsive, big-capacity dozing tractor. Powers $2\frac{1}{4}$ cu. yd. International Drott Skid-Shovel or Four-In-One; 15-ton capacity Superior Pipe-Boom; other similar-sized equipment.

Control Tower Visibility adds operating efficiency! See how new International crawlers are streamlined for complete job-control visibility. Seat is amply high to provide full view of equipment, terrain, and variations requiring operator action, to maintain efficiency.

Clean, safe deck cleared for action! Look down on that safe, clean, flush deck—a platform for full production. The wide, man-size seat is fully-adjustable; foam rubber padded. Instruments centralized for one-glance check-up! Even a cigarette lighter is provided, to prevent needless stops!

Pressurized Closed Cooling System for Positive Performance Protection! New pressurized cooling systems provide fast warm-up under thermostatic control—and positive ideal temperature control with forced circulation through full-length jackets. That aids clean combustion, guards oil film strength, protects performance. Radiator core assembly is easily-removable, without disturbing radiator guard or mounted equipment.

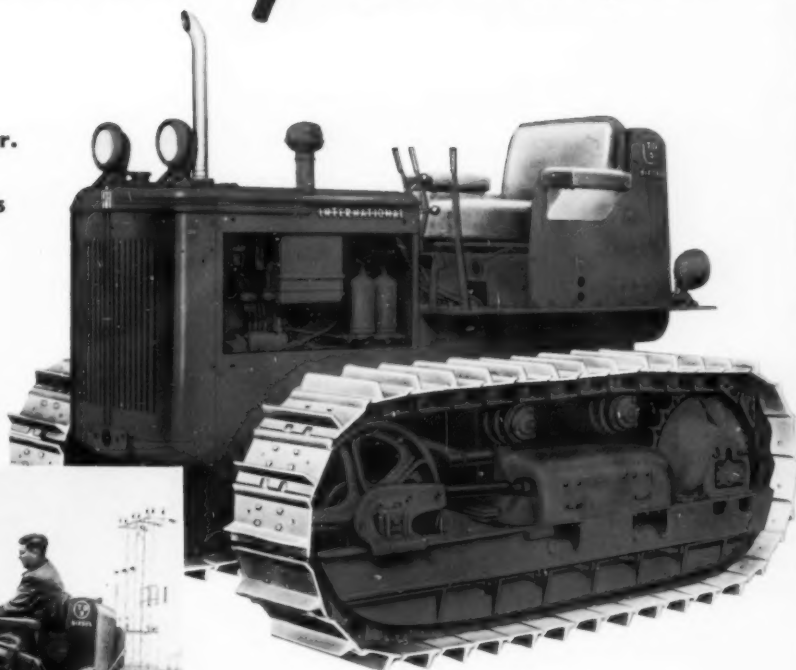


Give you Bonus horsepower— on your jobs, control your costs!

**66 Net Engine Horsepower.
In International Drott
Machines, Engine develops
71 Net Horsepower.**

91 Series

**TD
9**

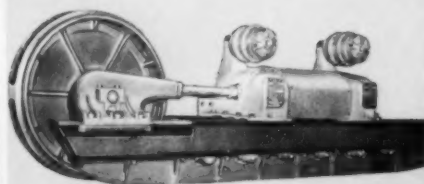
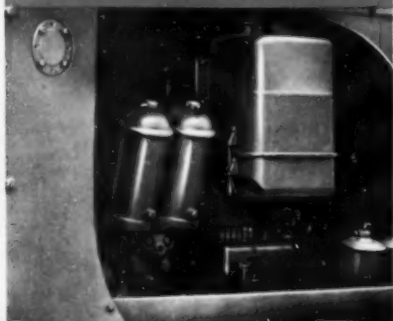


TD-9 diesel, (series 91), delivers 54.5 drawbar hp—up 32%. Operating weight (5-roller model), without equipment, 12,000 pounds. Now up in a new heavy-duty job range. New power is backed by new power train and track frame strength, new operating and servicing ease. Powers International Drott 1½ cu. yd. Skid-Shovel and other equipment requiring similar power.

480-hr. full-flow lube oil filters guard bearings, cut upkeep! Every drop of oil on its way to lubricate moving engine parts must pass through these new abrasive-trapping micron-type filters—with the capacity, strength, and efficiency to give 480 hours of wear-fighting, upkeep-cutting duty!

"Hydraulic Power Steering Inspires Operator Cooperation! New hydraulic power steering of the TD-14 and TD-18 cuts operator fatigue—and along with the other big effort-saving advantages, makes it easier than ever to deliver full-capacity production! TD-6 and TD-9 have spring boosters to lighten the operator's job.

"Bridge-strong" track frames for "slam-bang" conditions! You are looking at the strongest track frame in the industry for crawlers of TD-18 and TD-14 size! Heavy steel box-section beams, weld-joined to heavy stress-relieved steel plates—and rigidly gusset-braced—they're your foundations for record-making "rough-and-tumble" performance!



Steps up a size... in job range and capacity!

**50 Net Engine Horsepower.
In International Drott
Machines, Engine develops
55 Net Horsepower.**

61 Series

**TD
6**



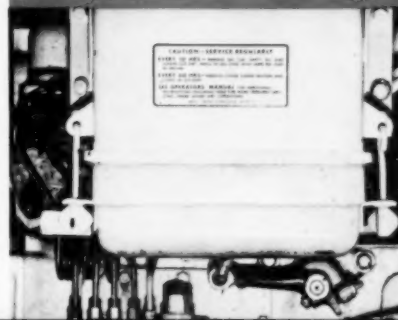
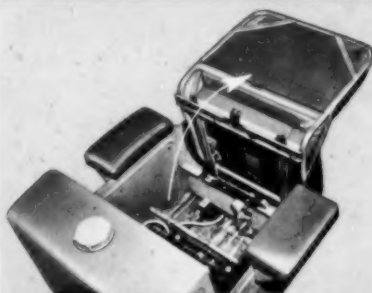
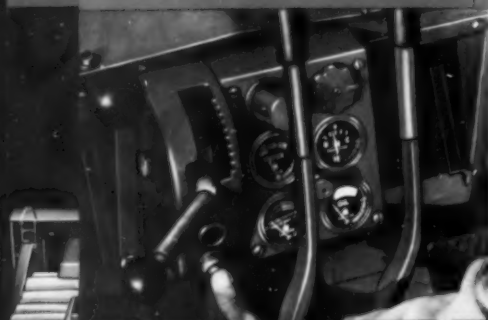
TD-6 diesel (series 61), 41.5 drawbar hp, up 23%! Steps up a whole size in work capacity and earning ability. Operating weight (5-roller model), without equipment, 8,890 pounds. Powers 1-yard International Drott Skid-Shovel or Four-In-One; serves as clean-up dozer unit on any-sized contract; versatility and low operating cost to do many sizes of jobs for every size of contractor.

Cent
ing e
craw
job-c
provi
and t
to m

Full-view, one-glance panel saves time—cuts effort! One quick glance at this new full-view panel, with centralized instrument grouping, gives the operator the instant check-up, to assure that lubrication, generator, and cooling system are "perking" for full production!

New Fold-over Seat Aids Fast, Centralized Servicing! New fold-over seat of the TD-6 and TD-9 models allows operator to give you the time and convenience advantages of centralized steering clutch assembly servicing. Lubricant fittings are conveniently grouped and fully accessible!

Thorough air filtration assured by new under-hood cleaner! Instead of being "in your lap," or a knee-bumping obstruction, air cleaners of the new International crawlers are side-mounted—for easy accessibility, yet out of the way. They have big capacity and high efficiency, too, for positive air filtration!



CLIPPER Sells MORE... Because CLIPPER Sells **QUALITY!**

Clipper[®] CONCRETE SAWS

Call Us For A **FREE**
Demonstration By A Clipper
Factory-Trained Representative



25 H. P.
Self-Propelled

• **Cut MORE Concrete
at LOWER Cost!**



MODEL
C-250

25 H. P. Gasoline Powered.
Gasoline or Electric Models
available from 1 1/2 to 36 H.P.

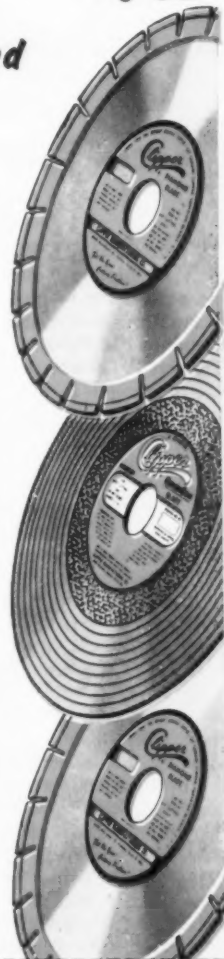
Clipper's SIMPLE design... RUGGED construction... DEPENDABLE performance give you a fast powerful Concrete Saw for heavy production cutting on all concrete and asphalt jobs.

EXCLUSIVE Clipper features include SELF-PROPELLED unit with ABRASIVE COATED DRIVE WHEELS and rear wheel drive for powerful forward thrust. POSITIVE SCREW FEED—a "Must" when using low-cost "Green-Con" Abrasive Blades to compensate for diminishing blade diameters. Protects valuable diamond blades from bumping and scraping. A Positive Control AT ALL TIMES!

CLIPPER BLADES for EVERY JOB

Use Genuine CLIPPER DIAMOND Blades for Cutting Cured or Green concrete and asphalt with any aggregate. CLIPPER "GREEN-CON" Abrasive Blades for cutting "green" Concrete. There is a Clipper Blade for ALL Your Jobs.

Ask for **FREE**
DEMONSTRATION
TRIAL
on Your Job!



USE GENUINE CLIPPER BLADES—Diamond & Green-Con Abrasive

DIAMOND BLADES for any job—any aggregate—every saw! Choose your Clipper Diamond Blade from a wide variety of specifications to cut green or old concrete with outstanding speed and economy.

GREEN-CON ABRASIVE BLADES give you savings as high as 80%—with completely new series of "Green-Con" Reinforced Abrasive Blades that cut "Green concrete" with the widest possible range of HARD to SOFT Limestone Aggregates.

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Mail the
Coupon
NOW!



• Genuine Clipper Products are Sold Only Direct, from Factory Branches in Principal Cities, Coast to Coast. Consult Your Phone Book, or Mail Coupon for Same-Day Service.

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2826 W. Warwick • Kansas City 8, Mo. 425X

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☐ Send FREE literature on Clipper Concrete Saws and Blades

☐ Have a Clipper factory trained representative call on me.

NAME _____

ADDRESS _____

CITY _____ STATE _____

... for more details circle 199, page 16

ROADS AND STREETS, April, 1956

77

Highway Estimating Methods

Beginning a series, written exclusively for **ROADS AND STREETS**, on the fundamentals and practical procedures which enable the highway contractor to put his estimating on a systematic and business-like basis.

By **George E. Deatherage, P.E.** Construction Consultant

I - General Overhead Costs

NO COMPREHENSIVE treatise on highway estimating has appeared on the market since the publication of "ROADS AND STREETS Construction Methods and Costs," by Halbert P. Gillette and John C. Black, last copyright in 1940. This volume of necessity reflected data collected some years previous so that, due to the great progress made in the heavy equipment field, the rapid increases in wage rates, and other changing conditions, the data in the above volume are not now applicable without a very considerable adjustment.

Engineers and contractors, no matter in what period or era, are always primarily vitally interested in costs and methods, since a thorough knowledge of these matters is the life blood of the construction business. Due to the rapidly changing conditions in the industry, the effect of deficit spending by local, state and federal governments resulting in a degree of monetary inflation, unit cost data can only be stated and used in the sense of being approximate. This conclusion must be true of all such data presented herein, as well as that from any other source. As a matter of fact, any published unit cost data must be subject to such check and adjustment in an attempt to make them conform to local conditions, equipment selection, wage rates, productivity of labor in good and bad times, etc.; the estimating labor involved is hardly less than required in building up an original estimated cost unit in which all the influencing factors are covered.

Highway departments, of course,

wish a rough approximate cost when making up estimates for budgetary and somewhat similar purposes. For these purposes, past historical prices per square yard, per lineal foot of standard bridge, etc., on similar work are often sufficient. Such units are units of *price* and not cost, as they include all costs of direct labor and materials, plus all other costs including the contractors overheads and profit. *Such prices are of little use to the contractor except as a check or cautionary signal, should his own current figures appear to be greatly out of line.*

Historical Costs

It is axiomatic of course that the only unit costs worth your full confidence are your own historical costs. And even these must be adjusted to the peculiar conditions of the specific work under consideration. In spite of this, it is a quite common practice among contractors to use published unit costs of others, or to "take the work at the going price." This is poker playing and should not be crowned with the dignity of a business practice.

If one's own historical costs are not sufficient to use without check and adjustment — of what weight are those of strangers? Particularly as there always remains the possibility of a unit being unbalanced so as to benefit from early pay items. The extreme mortality among contractors is due in great part to these unbusiness-like practices.

Successful contractors are very loath

to make public for the edification of others, the procedures and practices they have developed. Unfortunate also is the tendency of many equipment manufacturers to release production figures on machines which they sell to contractors. This is not true of all representative firms, but it is true of a great many who give as their excuse that the contractor would use these figures under conditions or situations other than those on which they were secured and be misleading. A minority will take the other extreme and work closely with a bidder in the selection of the equipment and in a varying sense guarantee a certain production for a specific job.

For the purposes of these articles therefore, it appears that what is needed is that emphasis be placed on "estimating methods," as applied to the quantity survey system of preparing cost estimates. And that where unit cost or production figures are given, they are to be used chiefly in an illustrative sense to complete a detailed explanation.

● *Need Good Printed Forms.* It is the authors contention that all estimates should be prepared on a standard printed and ruled form, designed for the specific class of work being estimated, with proper classification headings and columns for posting units, sub-totals and totals for each item. Such procedure is business-like, it saves time, enables accurate checking and many times prevents costly omissions — as a blank entry is a red flag to the checker.

In addition, with the aid of the above procedure, each estimate can be made in the same manner, with the items in the same sequence or order, so the work becomes systematic, neat and orderly. All dimensional and quantity calculations can then be set down, sub-totaled, totaled, and checked for each work classification. For any contractor who bids without an estimate check is looking for trouble. The decimal system should be used, of course, enabling a quick check by machine methods.

If, in addition, the estimate form is made up with the work classifications, coded to the contractors cost code, it will enable a direct estimate and cost

General Expense
REMINDER & CHECK LIST

CLASSIFICATION
General Conditions. _____ Date _____
State Rd. No. _____ Project No. _____ State Project No. _____
Other _____ Checker _____ Appvd. _____
Estimator _____ Location _____ Sheet No. 1
Cont. No. _____

Cost Code	ITEM DESCRIPTION	✓	x	-	NOTES
1-10	Surety Bonds				
11-11	Labor & Material Bonds.				
1-13	Finance Bonds.				
1-14	Sub Contract Bonds.				
15-2	Export Bonds.				
1-16	Special Bonds.				
1-17	Public Liability Insurance.				
18-1	Property Damage Insurance.				
1-19	Fire Insurance. Bldgs.				
1-20	Fire Insurance. Equipment.				
1-21	Fire Insurance. Shanties, etc.				
1-22	State Code Assessment.				
1-23	Wind and Storm Insurance.				
1-24	Earthquake Insurance.				
1-25	Flood Insurance.				

● Form sheet suggested for check list of General Overhead cost items. See page 86 for complete list of items.

comparison to be made in case the work is secured, without much, if any, additional work either for labor, materials or equipment.

The presence of sloppy, unsystematic and disorderly estimating practice is nearly always prima facie evidence of a contractor eventually getting into trouble. Some time ago, the author, as a consultant, was called in by a contractor who had been in business for some years, but who was about to fail. As always, the first question is a request to see a typical estimate. What was presented was about forty pages of yellow, legal sized foolscap. It was approximately named, as the estimate was written in pencil, both across the sheets and vertically in the margins, totals were set down with no calculations to support them. In many cases the units were stated with no breakdown to support them, erasures were more than common, parts were crossed out with no reason given, there were no work classifications, sub-totals, or indication whether as to or not sub-totals had all been added into the grand total. All indirect costs were taken care of by a lump sum allowance, with no details to back it up.

This lack of procedure and orderliness told the whole story! As it developed, it told how the contractor

did his buying, how he organized his work, how he took care of his equipment—all as messy as his estimating. The condition of his business reflected it.

● *Consider Indirect Costs.* In starting an estimate, it appears best first to consider all indirect costs. Gillette and Black define direct costs. . . "as the cost of all materials and labor used directly on the construction site or in transportation to it, plus equipment charges on a rental or other proper basis." The indirect costs are defined as those other than the direct costs. Accounting systems may develop borderline cases, but the important point is to make adequate provision for every item somewhere.

It is common practice, of course, to divide all direct costs into three main categories — labor, materials and equipment; the latter including the ownership and operating costs, as will be defined later.

● Indirect Costs in themselves are comprised of two main divisions: (1) Indirect Job Costs, (2) Indirect or Main Office Costs or Burden.

Indirect Job Costs may be further defined as indirect costs directly applicable to the work being estimated and which apply to it alone. The Main

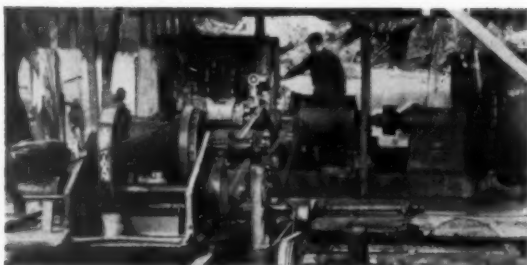
Office Costs are those general expense items that go on, whether or not there is work under way. In other words, it is the expense of doing business and is added to the estimate summary along with the estimated profit to be figured; such as adding 10% overhead and 15% profit or a total of 25%.

The author's practice is to divide the Job Overhead or Job Indirect Costs into three divisions under the heading of "General Expense," these being (1) General Conditions, (2) Staff Overhead, (3) Misc. Equipment, Tools and Supplies.

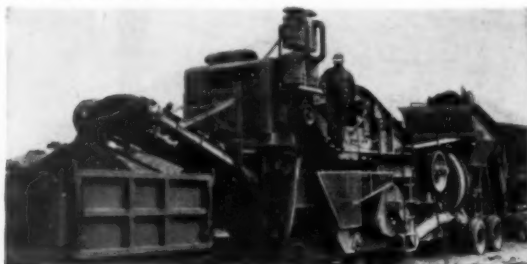
The latter item covering only such equipment not used directly on the site or as auxiliary service items such as pickup trucks, service trucks etc., as well as repair and maintenance shops and services. As we shall see later, if equipment is carried on the estimate at the rate which reflects only the hourly ownership/operating cost, the cost of idle time between jobs will need to be charged to the cost of doing business. The same applies to permanent shops, etc., for major overhaul and repair.

● *How to Begin.* Taking up the matter of first interest in preparing the estimate, is that of examining the site

(Continued on page 87)



PRODUCTION DOUBLED—FUEL COSTS CUT 33½%
When Clark & Sons Sand & Gravel Company switched to a GM 2-cycle Detroit Diesel properly engineered for this dredge, production jumped more than 200% and fuel costs dropped one third. GM Detroit Diesel weighs half as much as engine it replaced, starts easier, too.



FUEL COSTS \$1.18 PER HOUR

And that's "mighty cheap" for a 300-H.P. engine according to Charles Bartelma, Superintendent of Minnesota's Kimmes Construction Company. This GM Detroit Diesel-powered Cedarapids crusher produces 4,200 tons of gravel a day—engine has had no repairs in 2½ years.



PRODUCTION UP 30%—FUEL COSTS CUT 40%

When Calumet Paving Company switched to a GM Detroit Diesel on this paver they got an engine that "starts easier, performs better, costs less for fuel and maintenance." Company also operates two other pavers and three crawlers—all GM Detroit Diesel-powered.



15 YEARS' SERVICE AND STILL GOING STRONG
The GM Detroit Diesel in this Koehring shovel went to work for Paul Frank, Inc., in 1941—is still giving "economical, trouble-free service." Owner calls engine an "excellent investment, considering low first cost, operating economy and long life between overhauls."

For Lower Costs on **SPECIFY GM** In ALL Your



OPERATES 20 GM DETROIT DIESELS

Ohio road-builder A. J. Baltes, Inc., operates 20 GM Detroit Diesel engines powering shovels, cranes, draglines and other equipment. Company specifies GM Detroit Diesel power when ordering new equipment—also replaces other engines with GM Detroit Diesels to get "the fundamentals needed for economical operation—performance, economy and service availability."

Every Contract

DETROIT DIESEL POWER

Construction Equipment

YOU CAN HANDLE every construction job from first cut to final paving—and handle it at less cost—with General Motors Detroit Diesel-powered equipment.

Shovels, scrapers, compressors, graders—machinery for over 1,000 applications made by more than 150 manufacturers—are powered with GM Detroit Diesel engines, *America's first choice Diesel*.

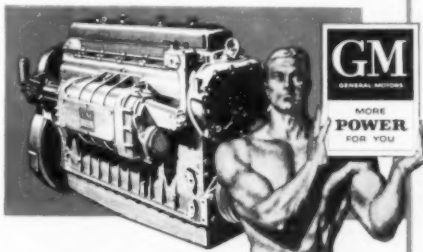
This compact, brawny work horse costs less to buy than other Diesels of comparable horsepower.

It costs less to run because its snappy 2-cycle operation gives faster acceleration, faster digging and hauling, more work done per shift.

And it costs less to maintain, too. Parts cost less. Valves, cylinder liners cost less than similar parts for other Diesels.

For full details on GM Detroit Diesels—and the equipment they power—call in your local GM Detroit Diesel distributor or write direct.

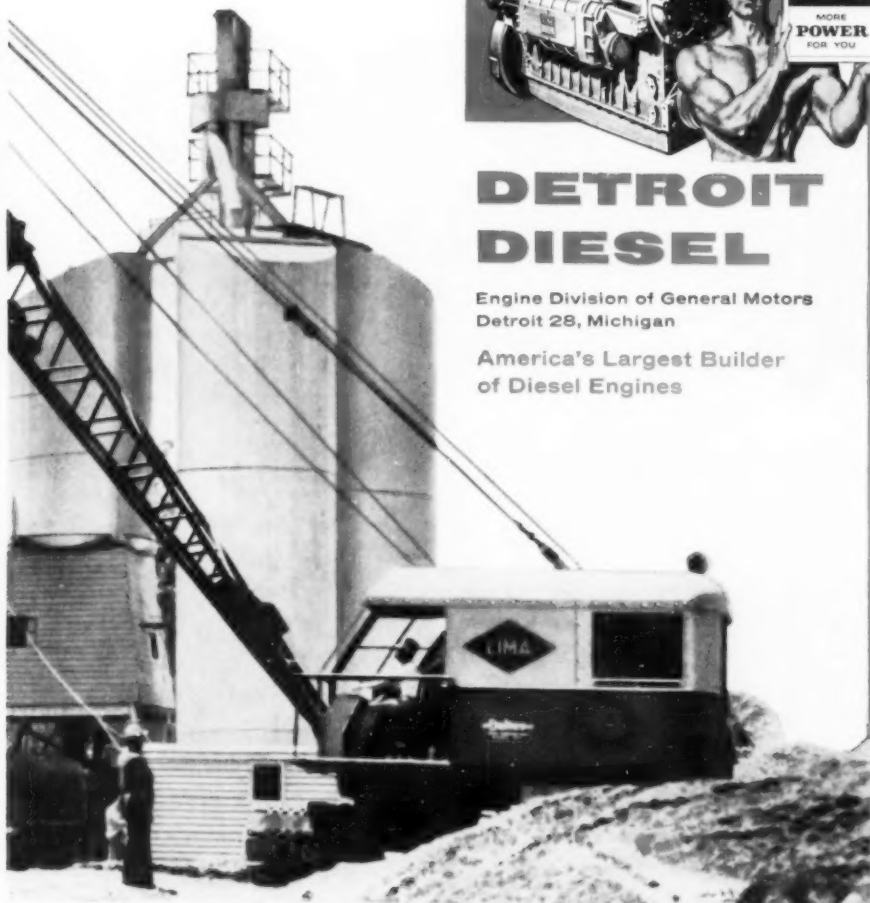
*Single Engines . . . 30 to 300 H.P.
Multiple Units . . . Up to 893 H.P.*



DETROIT DIESEL

Engine Division of General Motors
Detroit 28, Michigan

**America's Largest Builder
of Diesel Engines**



... for more details circle 210, page 16

Parts and Service

**When and Where
You Need 'em**

Back of GM Detroit Diesel performance stands a national network of 165 GM Detroit Diesel distributors and dealers.

They're ready to supply you with factory-engineered parts *where* and *when* you need them.

They're ready to send factory-trained servicemen speeding to your job day or night—men with all the skill and know-how it takes to keep your GM Detroit Diesels running right.

And they're ready to fill your every power need whatever it is—from a complete new engine to a minor replacement part.

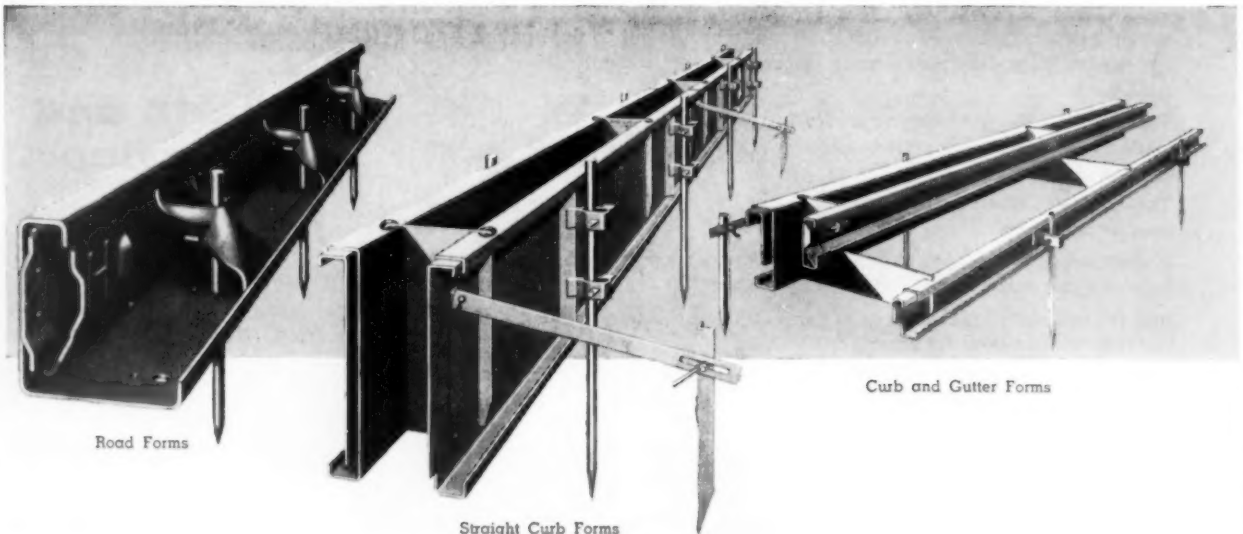
When you get replacement parts from your GM Detroit Diesel distributor or dealer you're getting *factory-engineered* parts built to the same high quality standards—by the same precision methods—as the parts used in building GM Detroit Diesel engines.

You get parts with every improvement advanced engineering has developed because *only* GM Detroit Diesel parts have *all* the improvements originated by GM engineers at Detroit Diesel.

And you get longer-wearing parts that have been proved in billions of hours of service on the toughest jobs.

For full details on the parts and service behind GM Detroit Diesel performance, call in your local GM Detroit Diesel distributor or dealer. He's listed in the Yellow Pages—or write direct for the name of the distributor nearest you.

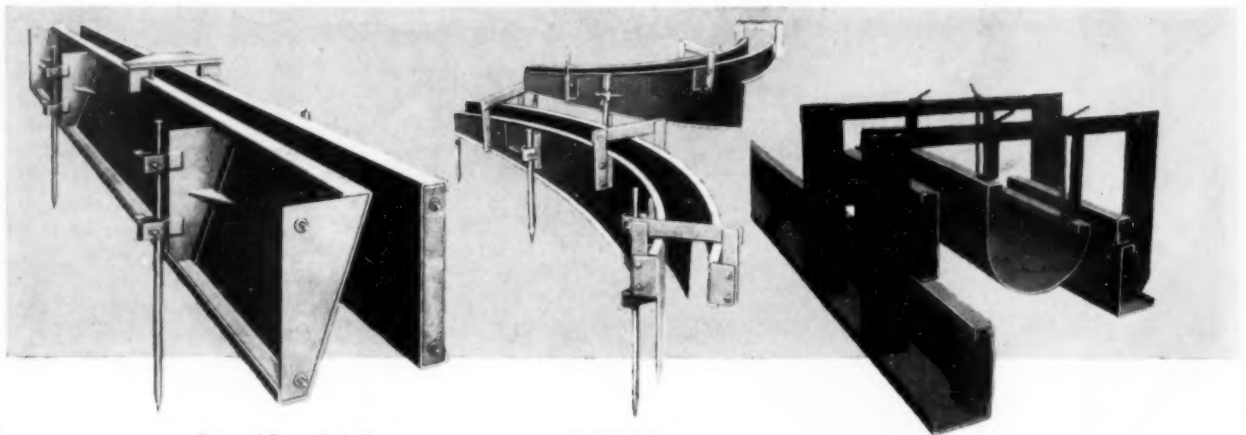
Form Engineering



Road Forms

Straight Curb Forms

Curb and Gutter Forms



Battered Face Curb Forms

Driveway Forms

Special Forms

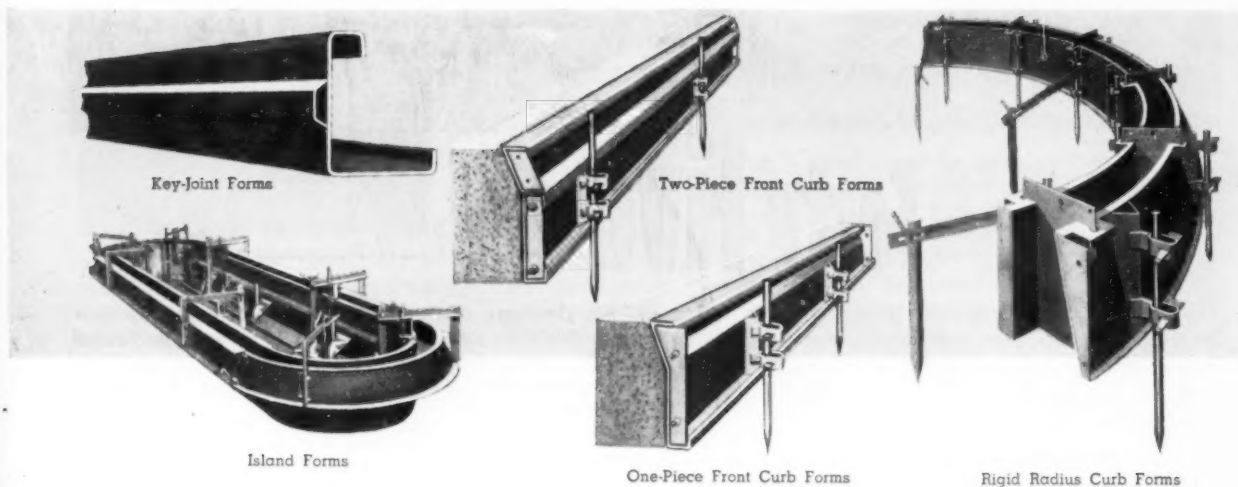
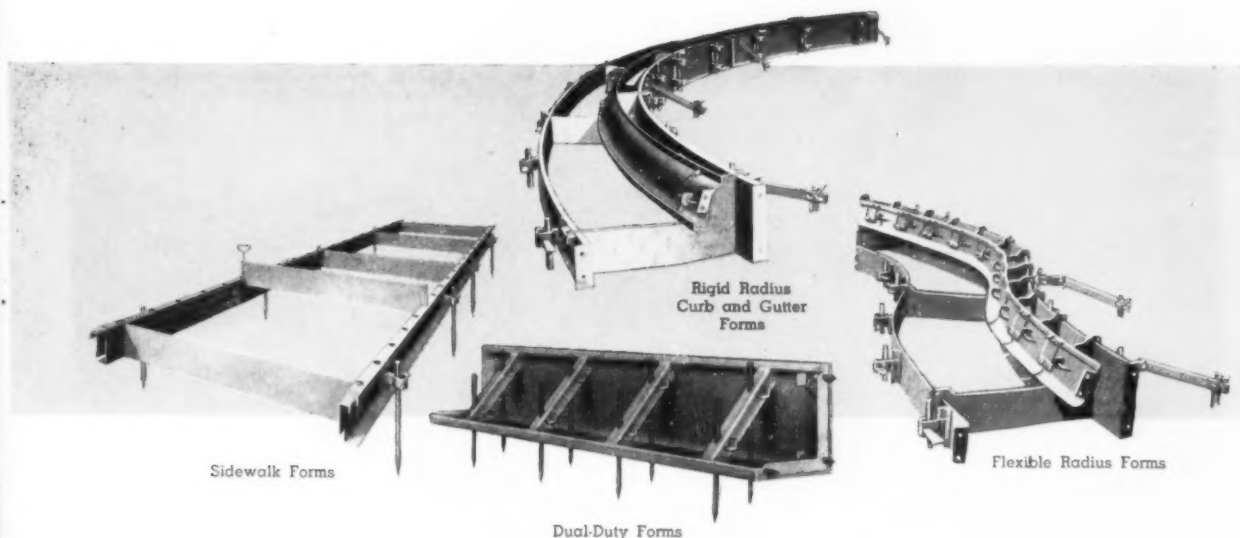
For 49 years, Heltzel has been supplying leading construction firms with the industry's finest engineered forms for the widest range of application.

It is this broad experience that enables Heltzel to better engineer steel forms for any specific requirement. And, because Heltzel engineers are always searching for better forming methods, you can

always be certain you're getting the most up-to-date equipment when you specify "Forms by Heltzel."

When next you're in the market for forms, standard or special, write direct or contact the Heltzel representative in your area. He carries many of the more popular styles and types in stock.

Never Stops At Heltzel



FOR YOUR FILES

Handy form booklets from which you will be able to select the exact form for any job need. Write today for your copies.

... for more details circle 216, page 16

ROADS AND STREETS, April, 1956

HELTZEL

STEEL FORMS



THE HELTZEL STEEL FORM and IRON COMPANY

70000 Thomas Road

WARREN, OHIO



**For big-scale performance.....
on all grading jobs**

SEE THE **Forty Five** BEFORE YOU BUY

Here's motor grader design that pays off in extra output on today's tougher, more precise jobs. You get these big advantages when you put the FORTY FIVE to work for you—more power at the wheels, more dirt at the blade, plus precision control and ease of operation.

Allis-Chalmers diesel engine with follow-through combustion provides real lugging ability . . . responds quickly to varying load conditions . . . has the power with tandem drive to pull through soft spots, roll big windrows, peel off that last inch of tough, hard dirt.

ROLL-AWAY moldboard reduces friction drag by rolling the load up and ahead of the blade edge . . . moves more dirt with less effort . . . makes more efficient use of engine power on sloping, rough grading, stripping and other heavy-duty construction and maintenance jobs.

Toggle-type controls give the operator finger-tip command of every blade position, every job. Exclusive mechanical toggle-type action provides a positive "feel," yet operation of moldboard components, scarifier and front wheel lean is accurate and easy.

Get a demonstration of the FORTY FIVE from your Allis-Chalmers dealer . . . let him show you how fully-enclosed power steering, accelerator-decelerator pedal, "box seat" comfort and visibility, and other features give you an extra measure of performance on all your grading jobs. Check the complete service program he offers you . . . factory-trained servicemen and True Original Parts for high-quality service, continued top performance and long equipment life.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN



ALLIS-CHALMERS

ROLL-AWAY is an ALLIS-CHALMERS trademark

Forty Five
120 brake hp
23,800 lb
6 forward speeds
to 20.6 mph
3 reverse speeds
to 7.0 mph

. . . for more details circle 179, page 16

ROADS AND STREETS, April, 1956

Personals

JAMES S. BIXBY, district engineer with the New York State Department of Public Works, has retired after 47 years of service with the State, effective May 1. During his career he helped supervise hundreds of millions of dollars in highways and bridge projects in the Long Island and the New York metropolitan area.

KENNETH L. BLACK, first president of the Virginia Roadbuilders Association, died recently at age 72. He was for many years a resident of Richmond, Virginia, and widely known in contracting circles.

WILLIAM POETER has succeeded Paul H. Gates as state highway commissioner of Vermont; Mr. Gates returning to business. Poeter is an engineer with wide construction com-



William Poeter

pany experience. Hebert E. Sargent continues as chief engineer of the commission.

STUART FITZPATRICK, manager of the Construction and Civic Development Department, Chamber of Commerce of the United States, died early March 2 in George Washington University hospital, after a long illness. He was 64. A nationally-known leader and writer in the construction field, Mr. Fitzpatrick also held one of the longest records in point of service to the Chamber, having been a member of the staff since 1918.

LAWRENCE J. RYAN, Chief Engineer of Construction, Cook County (Chicago) Highway Department, died recently. Mr. Ryan was a 30-year veteran with his organization, having survived two complete reorganizations, and was responsible for construction supervision of Edens, Calumet and other large expressways.

CHICAGO PNEUMATIC

DAVEY

POWER by HERCULES

OK COMPRESSOR

GARDNER-DENVER

WORTHINGTON

You can see . . .

HERCULES ENGINES are popular...
but let's talk performance.

Popularity isn't the only reason Hercules Engines power these well-known makes of air compressors. The main reason these companies select Hercules Engines is that they provide dependable power—engineered to the requirements of the compressor.

Air compressors, like other types of equipment, are designed by the manufacturer for specific capacities. They need an engine that will produce the rated power as well as a power plant to fit the operating features of the application.

Then too, owners appreciate the dependable service and "trouble-free" operation of Hercules Engines. They know that with routine maintenance, their Hercules powered equipment will give them years of "top-notch" performance.

With the addition of the recently announced G.O. Series (Gasoline Overhead Valve) and the D.D. Series (Direct Injection Diesel), Hercules customers have an even greater selection of internal combustion engines and power units. More than 90 different models are available from 3 to 500 H.P. for operation on natural gas, gasoline or diesel fuel.

Hercules Sales-engineers will be glad to assist you in solving your particular power problems. Drop us a letter, we'd be most happy to work with you—of course, there's no obligation.

All Types of Dependable Power



Gasoline



Diesel



HERCULES MOTORS CORPORATION, Canton, Ohio

... for more details circle 217, page 16

Reminder List of General Expense Items

These 219 items (with assigned cost code numbers) may not all be applicable to any one job, but they will serve as an invaluable check list of items that the contractor cannot afford to overlook in estimating his general overhead costs.

Cost Code and Item					
1-10 Surety Bonds	1-54 Building Permits	1-103 Empl. Adver. Expenses	1-159 Border Handling Charges		
1-11 Labor & Material Bonds.	1-55 Highway Permits	1-104 Standby Pay (Lost Time)	1-160 Equip. Return Bonds		
1-13 Finance Bonds	1-56 Walk & Curb Permits	1-105 First Aid Bldgs.	1-161 Other Exp. Bonds		
1-14 Sub Contract Bonds	1-57 St. Obstr. Permit & Fees	1-106 First Aid Supplies	1-162 Legal Exp. Ct. Fees		
1-15-2 Export Bonds	1-58 Temp. Bldg. Permits	1-107 Subsistence Expense	1-163 Entertainment Exp.		
1-16 Special Bonds	1-59 St. & Alley Rem. Permits	1-108 Hospital Expense	1-164 Contributions		
1-17 Public Liability Ins.	1-60 Dump Charges	1-109 Empl. Proces. (Lost Time)	1-165 Temp. Roads		
1-18-1 Property Damage Insurance	1-60A Penalty/Non-complet.	1-110 Travel Exp. (Overhead)	1-165A Temp. R/R Sidings		
1-19 Fire Insurance. Buildings	1-60B Amortization Allow.	1-111 Travel Exp. (Workmen)	1-166 Detour Roads		
1-20 Fire Insurance. Equipment	1-61 Water Conn. Permit	1-112 Misc. Travel Expense	1-167 Road Signs		
1-21 Fire Ins. Shanties etc.	1-62 Hydrant Use Fees	1-113 Passport Fees. Photos.	1-168 Bridge Reinf.		
1-22 State Code Assessment	1-63 Sewer Conn. Permits	1-113A Expediting Expense	1-169 Road Maintenance		
1-23 Wind and Storm Insurance	1-64 Encroachment Fees	1-114 Vacation Pay	1-170 Gate to Wk. Pay Loss		
1-24 Earthquake Ins.	1-65 Encroachment Permits	1-115 Sick Leave Pay	1-171 Temp. Fire Prot.		
1-25 Flood Insurance	1-66 Relocate Utilities	1-116 Temp. Serv. Stations	1-172 Temp. Fen. & Gate Housing		
1-26 Boiler Insurance	1-67 Elec. Conn. Permits	1-117 Fuel, Oil & Gas	1-173 Maint. Bldgs./Util.		
1-27 Interest on Proj. Fund	1-68 Gas Conn. Permits	1-118 Company Airplane Expense	1-174 Barricad. & Barr.		
1-28 Theft Insurance	1-69 Auto License Fees	1-119 Station Wagons	1-175 Winter Conditions		
1-29 Vehicle Insurance	1-70 Temp. Water	1-120 Pickup Trucks	1-176 Temp. Closures		
1-29A Contr. Contingent Liability	1-71 Temp. Power & Light	1-121 Mat. Load. Stations	1-176A Oper. & Maint. Sch.		
1-30 Ground Rental	1-72 Temp. Gas Conn.	1-122 Lub. Service Trucks	1-177 Str. Standby Pay.		
1-31 Owners Contingent Liability	1-73 Temp. Heat	1-123 Service Truck Exp. General	1-178 Bad Wea. Pay. Losses		
1-32 Marine Ins. and Cargo	1-74 Temp. Phone	1-124 Lowboy Haulers	1-179 Liquidated Damages		
1-33 Special Contingency Insurance	1-75 Tel. & Cable Charges	1-125 Gas Tank Trucks	1-180 Plt. Recapt. Losses		
1-33A Bad Weather Allowance	1-76 Temp. San. Facilities	1-126 Water Trucks	1-181 Disch. Pay Losses		
1-33B Loss from Work Reduction	1-77 Ice and Cups	1-127 Temp. Offices	1-182 Consulting Fees		
1-34 Workmans Compensation Ins.	1-78 Drinking Water Supply	1-128 Temp. Sheds	1-183 Prop. Home Off. Expense		
1-35 Old Age Pension Contribution	1-79 Remove Rubbish (not final)	1-129 Temp. Shops	1-184 Transp. Imp. Labor		
1-36 State Unemployment Insurance	1-80 Job Cleanup	1-130 Temp. Store Rooms	1-185 Guaranty Warranty		
1-37 Staff Salary	1-81 Gen. Incid. Expense	1-131 Traffic Maintenance	1-186 Protect Adj. Prop.		
1-38 Incr. Compensation rates	1-82 Photographs & Prints	1-132 Storage Yard	1-187 Protect. Trees		
1-39 Empl. Retirement Fund	1-83 Final Job Cleanup	1-133 Equipment Yard	1-188 Directional Signs		
1-40 Empl. Welfare Funds	1-84 Walkie-Talkie Radio	1-134 Airport	1-189 Contr. Signs		
1-41 Other Payroll Taxes	1-85 Auto Radio Expense	1-135 Testing Lab. Bldg.	1-192 Badges and Brass		
1-42 Sales Taxes	1-86 Office Inter-Comm. System	1-136 Testing Lab. Equip.	1-193 Lights & Barricades		
1-43 Federal Taxes	1-87 Auto-Call System	1-137 Core Drilling	1-194 Surveys & Layout		
1-44 State Taxes	1-88 Loss. Long Dist. Calls	1-138 Load Tests	1-195 Restore Dama. Prop.		
1-45 County Taxes	1-89 Office Equipment	1-139 Camp Buildings	1-196 Contr. License Fee		
1-46 City Taxes	1-90 Office Supplies	1-140 Camp Equipment	1-197 Bidding Expense		
1-47 Income Taxes	1-91 Misc. Freight	1-141 Loss on Meals etc.	1-198 Financing Charges		
1-48 Occupational Taxes	1-92 Misc. Drayage	1-142 Site Rentals	1-199 Deposit on Plans		
1-50 Equip. Oper. Taxes	1-93 Misc. Express	1-143 Auto Camp Exp.	1-200 Empl. Fringe Bene.		
1-51 Highway Use Taxes	1-94 Field Office Supplies	1-144 Trailer Expense	1-201 Int. on Deposits		
1-52 Machinery Occup. Taxes	1-95 Postage	1-145 Loss on Camp Oper.	1-202 Int. Bor. Money		
1-53 Special Taxes	1-96 Air Express	1-146 Canteen Expense	1-203 Disc. Bds/Warrants		
	1-97 Blueprints and Stats	1-147 Plant Standby Exp.	1-204 Loss. Ret. Percent.		
	1-98 Samples & Models	1-148 Overtime not anti.	1-205 Loss on Ext. Work		
	1-99 Stationery & Supplies	1-149 Cut. Other Trades	1-206 Dues & Asses.		
	1-100 Tel. Toll Charges	1-150 Patch. Other Trades	1-207 Special Invest.		
	1-101 Material Price Inc.	1-151 Losses-Cur. Exchange	1-208 Renegotiation Exp.		
	1-102 Labor Rate Increases	1-152 Lost Discounts	1-209 Losses. Cond. Work.		
		1-153 Interest	1-210 Guest House Exp.		
		1-154 Lost Interest	1-211 Misc. Incid. Exp.		
		1-155 Export Licenses	1-212 Waste on Mat. Allowance		
		1-156 Inspection Fees	1-213 Rehandling Mat.		
		1-157 Inspection Charges	1-214 Easements and R/W		
		1-158 Custom Duties	1-215 Shifting Plt. Locat.		
			1-216 Labor Troubles.		
			1-217 Insection/Super.		
			1-218 Sub-Cont. Fail.		
			1-219 Delayed pay. on work done.		

Contractors "Let Fly" on Job Supervision

Blunt and forthright speakers at panel session think resident engineers should be restored to old-time position of authority and responsibility, comparable to that of the contractor's superintendent.

THERE are three good ways, as far as contractors are concerned, for a state highway department to get the most out of its construction dollar, Burl H. Wilder, general superintendent of the Savin Construction Co., New Haven, Conn., told highway officials in Boston. The occasion was the annual meeting of the Association of Highway Officials of North Atlantic States.

Some of Mr. Wilder's points:

- "Make it easy for the contractor to do his job and he will quickly come back to you with lower bids."

- "Don't design monuments; design simple, practical roads."

- "Help your contractor to obtain materials."

Excerpts from Mr. Wilder's talk include the following arguments:

"The day when the resident engineer on a project ran his job for the

state with the same responsibility, personal interest, and judgment as the superintendent runs his part of the job for the contractor is probably gone forever. With its passing has gone the cheapest method of administering a project.

"When either the resident engineer or the superintendent has to send six copies to six different persons and the decisions, approvals and comments work their way back out into the field, the costs have increased on both sides. From your side, please consider this: When one more department becomes involved, it means another engineer to process the mail, another stenographer, another file, another office, another car, etc.

"It also means added costs to the
(Continued on page 147)

Highway Estimating

(Continued from page 79)

of the work and recording as far as possible the conditions under which the work is to be done, source of available materials, available utilities, etc. An excellent four-page form for this purpose (Form I-R-I, Preliminary Work Report and Estimating Information) may be purchased from Roche Estimating Methods, 128 Western Avenue, Glendale 1, California).

The next step is that of a thorough study of the plans, specifications' contract agreement and its general conditions, the bidding documents or any other available information as to the nature and scope of the work — with the purpose of identifying any and all items of indirect job cost, or general expense items.

As will be noted later, there are more than two hundred possible general expense items connected with bidding highway work. It is impractical to attempt to remember all these items.

- **Check Lists.** The use of "Reminder" or "Check" lists have long been in use by progressive contractors, although they have in general been limited to overhead items, but excluding the tools, supplies, construction stores and miscellaneous equipment. Many stand-

ard "Estimate Summary Forms" for the building trades are constructed on this basis. On every large job, there are, of course, hundreds of items that are necessary to the work in the general category of miscellaneous equipment, small tools and supplies. The estimator who can remember all of these does not exist. Those items required, but missed, must have their cost taken out of the Overhead and Profit.

- Estimating is a meticulous business when done properly and no detail should escape attention, for success is built upon attention to details. In a general sense, the more "finicky" the estimator is, the more accurate the bid. One can be "finicky" without losing time, if, when he first goes through the contract documents, bid form, plans and specifications, he provides himself with a printed or multilithed "Reminder List" on cross-section paper. As for example the one presented herein for the General Expense item, "General Conditions," and the similar one prepared for Staff Overhead and Misc. Equipment, Tools and Supplies.

Whenever one of the standard items appears in the preliminary "lookover," as stated above, a check mark is made in a square opposite the item on the Reminder or Check list; followed by

pertinent notes. This is a red flag to the estimator that such an item is required and that provision must be made for it in the estimate. This standard and systematized procedure takes the place of random notes made on scrap paper. As the estimate is then made and entered on the estimate sheets, the item is given an "X" as having been provided for. If a "Check List" item does not appear, it is marked out thus (——) or this left to be done, until the takeoff is made.

No "Reminder" or "check list" can possibly contain all the items that may be required, but when these are confronted, an entry should be made under "notes" or "special items."

A thorough study of the plans and specifications during takeoff may develop other items required and these should be noted on the list with colored pencil, denoting that they do not appear other than in the plans and specifications.

- "Check Lists" for a specific job should be filed as part of the estimating papers as a matter of record and reference. Many debatable questions can be answered by this record after the contract has been secured. A suggested form for a "Reminder List," together with a list of some 219 possible items, is published with this article.

How "Surge" Principle Helps Step Up the Cement Treatment Job

Nation's largest specialist in soil-cement and cement treated base uses this principle to assure good coordination and steadiest progress of every job operation.

By Harold G. Buttles

Traffic Manager, Miles and Sons Trucking Service,
Merced, California

SOME of the new ideas that we have either invented, or confiscated, which are now in use for our cement treated base construction work include the spray bar on the mixers, leveling screeds, water wagons behind mixers, and the reverse plow on the cement distributor.

Upon observing the spray bars on the mixers in operation, the Assistant Highway Engineer of the State of California commented that he was very pleased with them, and thought that they should be required equipment on every job.

Leveling screeds, another new idea, are attached and made a part of the mixers at the back end. Some people call them "V" blades. They are two mold boards from a motor patrol forming a "V," going out to a 12-ft. width, adjustable up and down, and knocking down the windrow and spreading it out to an approximate uncompacted lift. This practically cuts out the use of one motor grader.

The water wagons behind the mixers insure constant mixing without stops for hooking up and unhooking

of the water trucks. This saves time on a large job.

The idea of the reverse plow on the cement distributor is a new one that helps in either windy or damp conditions.

● **Coordination.** As far as operations are concerned, the most important item is coordination. Of course, this is true on any job, but as far as a cement treated base outfit, I compare this to a concrete paving spread. You have a long line of equipment — from the cement plant to the cement transports, to the unloading bazookas, to the cement distributor, to the mixers, to the laying and compacting machine behind the mixers — everything MUST be COORDINATED, and everything MUST run smoothly. Any one piece of equipment breaking down can slow down or stop the complete operation.

● **"Surge" Principle.** Another important item in mixing cement treated base is to have as many surge points as possible throughout the operation. To illustrate — wherever you can still meet the specifications, get your material away out ahead of the mixer spread, so that if your rock plant breaks down, or your hauling equipment is short, it is not going to slow down operations. Following along with this, your day's requirement of cement should be spread out as far as possible in front of your mixers for the same reason that if your spreader should be temporarily out of use, or the loads of cement are delayed, your mixers will not have to stop. To insure this, we start our cement spreaders about two or three hours each day before we start mixing. Also, you

must have enough laying and compacting equipment behind the mixers so that they can stay quite close to the mixing spread, and the material will not dry out. All in all, just like concrete spread, you MUST have a well balanced line of equipment.

● **Full-Width Construction.** I would like to say something in favor of full width construction. While taking twice or three times the normal amount of equipment, it can result in cheaper costs due to the huge volume that can be turned out in a normal working day; plus, the fact that this item is completed as you go along, with no back-tracking required.

Today's competitive prices force contractors to strive for the highest production possible, and there is the opportunity on high volume jobs to push production, doing it both fast and economically. Our experience has been that a better job, all the way around, results. Our experience has further taught us that a large degree of CONTROL over certain portions of this operation is necessary. As our cement treated base operations now stand, we have full control — from the cement plant throughout the operation, to the mixed material in the windrow. Perhaps, in days to come, we may find that it will be to our advantage to do the laying and compacting also, to insure complete control over the items.

In summarizing this talk, I would like to say that we consider the production of cement treated bases to be a highly specialized segment of highway construction; and in the hands of inexperienced people, it can result in very poor jobs. While if constructed correctly, the results can be very gratifying and lasting.

BRAMLAGE APPOINTED LITTLEFORD AD. McR. Littleford Bros., Inc., Cincinnati, Ohio, have announced the appointment of William Bramlage as advertising and sales promotion manager for the black top road building equipment and metal fabricating divisions. Prior to joining Littleford, Mr. Bramlage was associated for several years with the advertising department of the Globe-Wernicke Co., Norwood, Ohio.

Excerpts from a paper, "Mass Production of Soil-Cement in California," given at the American Road Builders' Association annual convention, Miami, Fla., January 11-14, 1956. Mr. Buttles handles estimating, bidding, negotiating and overseeing of operations for his firm's construction division, which concentrates on cement treatment work and has taken jobs, as specialists, on highway and air-field work in various parts of the country. Miles and Sons' handling of California's largest cement-treated base contract was described in article, "Three Mixers Abreast," ROADS AND STREETS, November, 1955.



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Tops the field in pull and push-power! Delivers 4,379 pounds maximum pull at typical operating weight. 39.5 maximum drawbar hp.

10 speeds forward, 2 reverse with optional IH Torque Amplifier drive. Operator can change speed in any gear to boost pull-power up to 45% *On The Go!*

UNLIMITED hydraulic equipment control. Front and rear-mounted equipment controlled individually or *both at the same time*, using either single or double-acting cylinders—or *both*. Front and rear power drives available for equipment with built-in pumps.

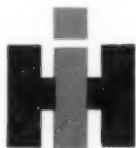
Fast-Hitch. Just back the tractor—equipment coupling beams engage *automatically* on rear-mounted blades, scoops, and other Fast-Hitch equipment. Low-cost adapter available for 3-point equipment.

Power Steer. Optional. Takes work out of maneuvering in soft, rutted ground; reduces operator fatigue particularly on loader jobs.

Here's a new utility tractor that outperforms and outlasts anything you've seen up to now! It has up to 1,000 pounds more built-in weight to deliver traction where lighter weight utility tractors slip or stall. Big pneumatic tires turn this power and weight into effective traction equally well on paved factory aisles and yards, and on the soft footing of construction and other off-pavement work. *Ten forward speeds to 16.8 mph*, with exclusive Torque Amplifier drive, lets the operator select the best working speed for each specific job.

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A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Tractor and Rubber-Tired Loaders... Diesel and Carbureted Engines... Farm Machinery... Motor Trucks.

... for more details circle 223, page 16

ROADS AND STREETS, April, 1956

Special Set-Up For High Speed Breccia Production

*Dual crushing and screening plant
produced high output of base
aggregate for large cement treatment
contract in California*



● White 3-axle 10-tired trucks, carrying 20 tons, were made available for this job with over-the-road axle limitations.

IN THE CONSTRUCTION of a 13.1-mile dual freeway section of California U. S. 40, over 400,000 tons of aggregates for untreated and cement-treated base was produced in a plant erected for the job. Baldwin Contracting Company, Inc., Marysville, Calif. (A. J. Vercruyssen, Superintendent) was the contractor.*

A local volcanic breccia material was used which, while classified as soft rock, required "hard rock" drilling and

blasting methods. Five Ingersoll-Rand wagon drills powered by Schramm and other compressors totaling 1,700 cfm were required to keep pace with plant production. Ingersoll-Rand 2½-in. tungsten carbide tipped bits were used for this hard, highly abrasive material, this equipment averaging 800 to 1,000 ft. of hole per day per drill. The pit was quarried in 12 or 13 ft. lifts.

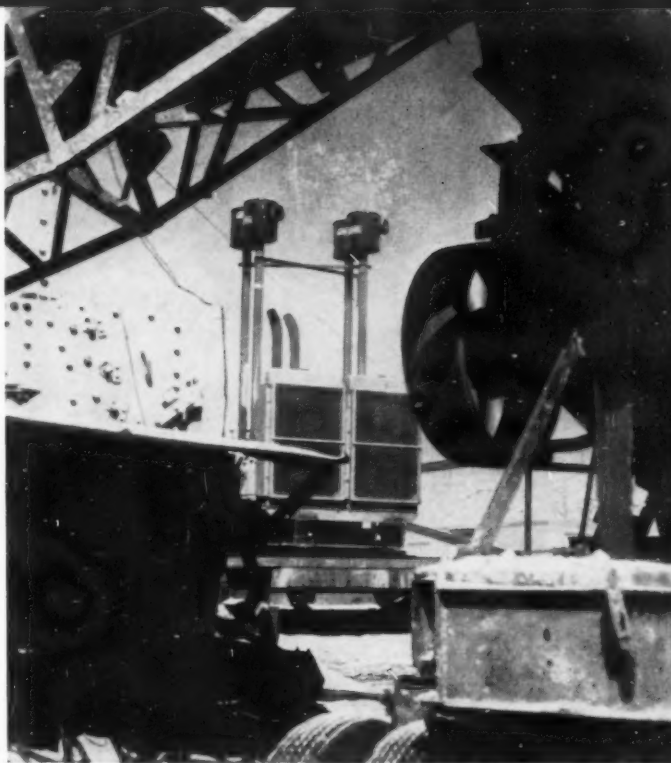
Fair fragmentation of the irregularly cemented material

- "Crazy mixed up plant." Equipment was jackknifed into a small working area. Simplicity screen unit referred to in article is seen at right. In the background are the Universal and Pioneer units, and the breccia pit floor.

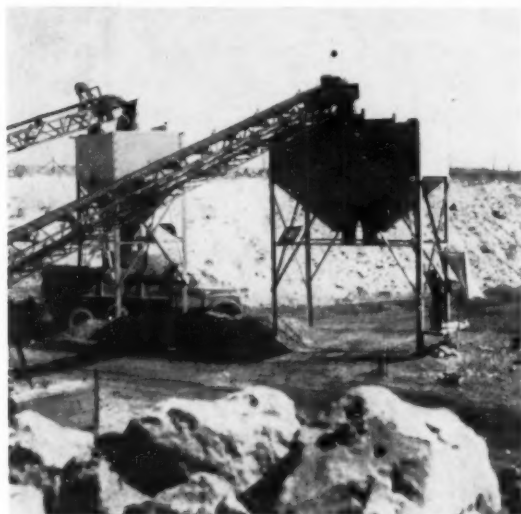




● The Cat D8800 and D17000 power units, as set up to handle belts and screens and the Pioneer plant.



● Glimpse of twin General Motors diesel 671 engines which powered one of the aggregate units.



● The two bins receiving from the two production lines, affording simultaneous loading and haulaway for high-speed delivery to job.

Aggregate for both the untreated and the treated base came from the same crusher run of this material. Gradation was specified as follows:

Sieve Size	Percent Passing
2 in.	100
1½ in.	90-100
¾ in.	50-90
No. 20	25-50
No. 200	0-15

This gradation was adopted to utilize the somewhat coarser than average material and provide good gradation with sufficient fines for binding into a dense base. It represents a modification of the California standard for

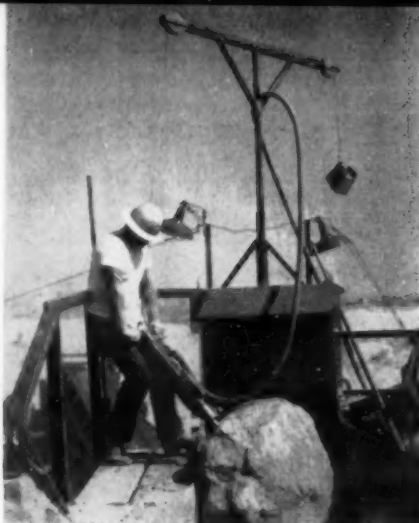
was obtained by a shooting pattern involving 0-1-2-3-4-5, etc. delays for successive rows back from the face, using Atlas delay caps and Atlas 45% Amodyne.

Quarried material was dozed or sledged out with two Model RU LeTourneau scrapers drawn by Caterpillar D8's and push-loaded with an International TD-24. After being loaded right up to the hopper, the scrapers were turned sharply, dumped, and material pushed with an Allis-Chalmers HD-20 dozer. Occasional very large boulders were broken up at the hopper with a Thor pavement breaker suspended from a counterweighted cable and powered with an Ingersoll-Rand 125 compressor.

● LeTourneau scrapers, Caterpillar tractors and Allis-Chalmers dozer delivered blasted breccia to the feeder.



*See article, "Three Mixers Abreast Process Big Cement-Treated Base Job," *ROADS AND STREETS*, November, 1955.



● (Left): Big boulder headed for hopper. (Center): Thor pavement breaker suspended from a counterweighted cable, begins splitting the chunk. (Right): Break-up job completed sufficiently for the fragments to go through onto 8 in. grizzly.

Class A cement-treated base material, which is for 1 in. maximum.

The aggregate plant as built had two production lines for a single grade of material. One line passed directly from a Universal Impact Master Model 3645 unit, powered by twin General Motors 671 diesel engines; the other from a Pioneer duplex 10x36 and 40x22 crushing plant, powered by a Cat D17000 diesel plant. Following were the lines of flow:

The material went over a grizzly 10'x15' in area, and the material passing 8 in. dropped down into a hopper with pan-type feeder and was fed to the Pioneer duplex. The plus 8 in. material, which was retained in the grizzly was fed over an apron-type feeder to the Universal Impact Master 3645. About 85 percent of the material going through the Impact Master met state specifications.

After passing through the Impact Master, the material dumped onto a 5'x10' Simplicity screen, the minus 2 in. material dropping directly on a



● How breccia fragmented using millisecond delay blasting.

30-in. belt and conveyed to one of the loading bunkers. The 15 percent of material retained was returned to the Pioneer duplex and discharged directly onto the 40x22 rolls, being

thus reduced and becoming part of the Pioneer duplex production. The contractor did not produce other than the one type or size of material.

To get back to the Pioneer duplex, the material passing 8 in. was fed to the Pioneer in the standard manner and produced essentially the same material as the Impact Master.

The breccia as found in this pit is definitely a rock and crumbles only after shooting and on impact, the proof being that the heaviest rippers available would do no more than scratch the surface. The reason for this design of plant, was the necessity of economical production of large quantities of aggregates.

Belts and screens were powered by a Cat D8800 generator set. Crusher output was also stockpiled over a tunnel belt to provide supplementary loading in event of plant shut-down.

● Five wagon drills were required to keep up with the plant production of 4,000 tons per single-shift day.

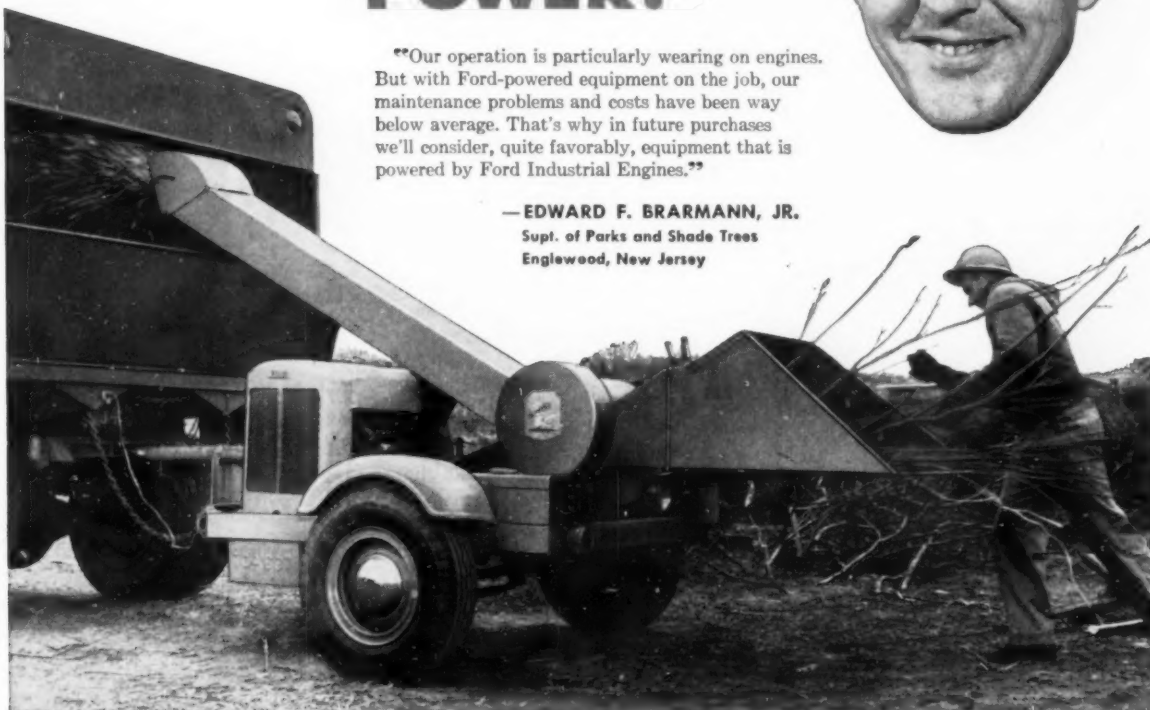


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"Our operation is particularly wearing on engines. But with Ford-powered equipment on the job, our maintenance problems and costs have been way below average. That's why in future purchases we'll consider, quite favorably, equipment that is powered by Ford Industrial Engines."

—EDWARD F. BRARMANN, JR.
Supt. of Parks and Shade Trees
Englewood, New Jersey



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Englewood's Park Department now owns a total of six Ford-powered field units. Above, you see one of them in action—a 12" Asplundh Brush Chipper.

Powered by a Ford "172" Heavy Duty Industrial Engine, this speedy worker takes on branches up to a half-foot in diameter. It eliminates double handling, does away with countless trips to dumping areas and steps up Englewood's brush removal program by an estimated *six times*.

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that goes to waste in ordinary engines. The benefits of deep-block construction (also available in Ford's new super-efficient 4-cylinder Diesel) are a smoother running, more durable engine—one that requires minimum maintenance even in the toughest going.

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INDUSTRIAL ENGINE DEPT. FORD Division of FORD MOTOR COMPANY P. O. BOX 598, DEARBORN, MICH.

. . . for more details circle 279, page 16

ROADS AND STREETS, April, 1956

Wisconsin Puts its Engineers in ENGINEERING JOBS

By Duane L. Cronk

Washington Editor of ROADS AND STREETS

IN ALL THE hue and cry about the shortage of engineers, state highway departments have yet to utilize completely the engineering manpower already on their staffs, some officials insist. Their thinking runs along these lines:

"Engineers can become enmeshed in a maze of routine administrative duties; they can be submerged in jobs that high school graduates could do. It is possible for a highway department to beat its engineering shortage not only by recruiting new men, but by using its present engineers as engineers."

Such a philosophy may be easy to come by, but hard to put into practice. It disturbs some concepts of highway administration that have built up over a number of years. Many officials believe that engineering experience should be a pre-requisite to most highway administration jobs.

In the Wisconsin State Highway Department, however, these ideas

have been challenged — with rather remarkable results. And one important outcome is that the state highway department is starting to beat its engineering shortage. Harold L. Plummer, Chairman of the Commission, pointed out that in 1954, the organization's engineering staff of 403 men handled a \$40 million program. In 1956 the state's roadbuilding program will be \$106 million, but, under the present organization, the same number of engineers will handle the much-larger job.

Back of this ability of a slowly growing staff to handle a rapidly growing construction program, are four factors:

- A complete departmental reorganization taking engineers out of non-engineering jobs and utilizing them in engineering and supervisory capacities.

- Decentralization — cutting the headquarters staff to a skeleton force

and keeping the engineering load in the district offices, thus avoiding duplication of work.

- Recruitment of non-professionals to relieve engineers of semi-skilled jobs.

- Creation of many advancement opportunities to increase morale and effort.

The manpower management concept being tested in Wisconsin is based on the belief that engineers are at their best in engineering work. ("We don't have to use our engineers as office managers.") To implement this theory required a complete reorganization of the department in Wisconsin. Engineers were transferred out of divisions like Right-of-Way and Planning. Today engineers are few or entirely absent in those two departments. Eventually the commission will dispense with use of engineers in such activities as Right of Way.

Headquarters Skeleton

Next, the central headquarters staff of engineers was deliberately kept at a skeleton level. Of the department's 403 engineers, only 63 are in central headquarters and most of these are in highly specialized jobs — 17 in the Bridge Department, 13 in materials and Research, and 10 in Design. The concentration of engineering is throughout the districts, close to engineering situations.

The Wisconsin highway department has been called the most decentralized in the country. Officials there refer to it as "a plan of decentralization with centralized controls." Under the scheme, the operating units (districts) have authority to make decisions within definite limits specified by the commission. In the central office, the staff divisions provide advice on research and planning, finance and accounting, engineering, personnel and management consultation. In brief, the function of the cen-

(Continued on page 98)



• This Wisconsin construction engineer, right, is in charge of several projects in the Milwaukee area, typical of the Wisconsin operation. He serves in a supervisory capacity and is assisted by several experienced engineering aides. (Wisconsin Highway Commission Photo.)



*"I'm burning these ten-spots," said Hodge,
Burning bills in his big truck garage,
"To show how we lose,
When a new truck we choose,
Without first having checked on Dodge!"*

QUICK QUIZ FOR TRUCK BUYERS

Try this quick quiz before you buy your next truck—and you'll get a better truck for your money:

- Q.** What truck line offers you *today's lowest prices* on such popular models as the ½-ton panel, the 1-ton express, and the 1½- and 2-ton stakes?
- Q.** Which truck line has the largest cabs?
- Q.** Which has the greatest driver visibility?
- Q.** Which has the shortest turning radius?

The answer is "Dodge"—leader for the last 39 years. And this year "Dodge" is the answer to virtually every question you can ask that has to do with lower cost haulage or delivery.

You'll find Dodge trucks are the best answer, too, on price. For Dodge trucks are priced so competitively that no one can beat your Dodge dealer's deal.

When time comes to buy your next truck—get the answers that will lead you straight to today's best truck value—Dodge.



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TRUCKS

WITH THE FORWARD LOOK

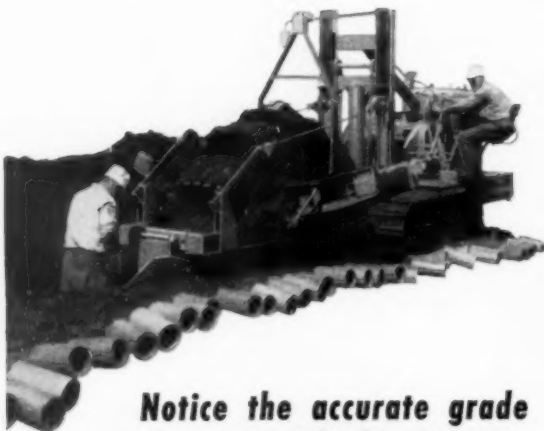


Get the Dodge Dealer's Deal Before You Decide

... for more details circle 196, page 16

ROADS AND STREETS, April, 1956

Digs up to 25 FEET per minute



**Notice the accurate grade
you get with this Parsons
150 wheel-type Trenchliner**

For pipeline, drainage, irrigation and utility trenching, Parsons 150 Trenchliner brings you big work capacity and precision grading accuracy. It digs from 12 inches to 25 lineal feet of trench per minute. 30 digging feeds assure maximum trench production at every depth, width, and in all soil conditions. Cutting widths range from 16 to 26 inches. Maximum digging depth is 5¾ feet.

Hydraulic wheel-hoist gives smooth, positive control of trench depth. A hydraulic ram on vertical mast raises and lowers the digging wheel — maintains close grade tolerance, an important advantage on any trenching job. A separate hydraulic ram tilts the mast — balances weight of wheel forward on the machine when traveling, loading or unloading on trailer.

For digging dry or wet materials, quick-change buckets on the Parsons 150 Trenchliner are available with gumbo lips, or self-sharpening reversible "Tap-In" teeth. Shiftable, reversible belt conveyor gives controlled discharge, places spoil bank on either side of trench. Tile-laying box and chute (optional) save time and labor on drainage jobs. To suit varying job conditions, this 150 Trenchliner is also available with 16-inch, lug-type crawlers, or 12-inch crawlers with street shoes. Your Parsons distributor has more information that will interest you. See him soon, or write for bulletin.

... Send to: **PARSONS CO., Newton, Iowa** ...
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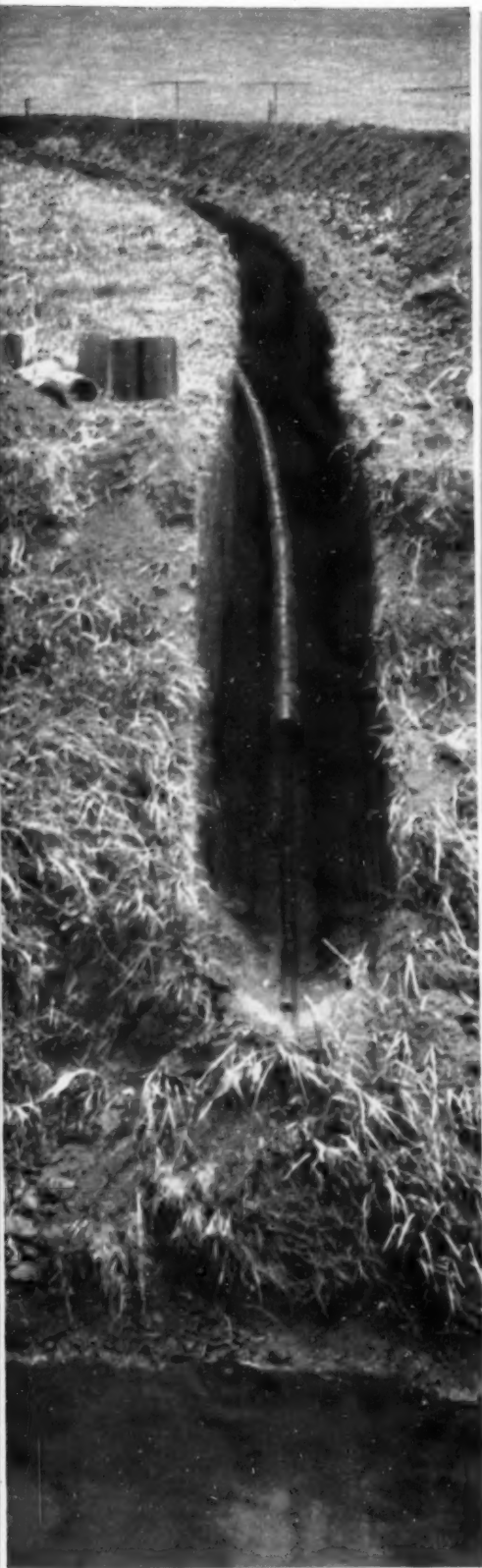


(Kiewit
Subsidiary)

PARSONS TRENCHLINERS®

SP516





5 OTHER SIZES Parsons Trenchliners include wheel and ladder types, crawler-mounted, and utility-size rubber-tired Trenchmobile®

Bearings packed only once a year on this 3½-P mixer

For more work-time, less maintenance, check this Kwik-Mix 3½-P plaster-mortar mixer. There is no daily lubrication required on the antifriction paddle-shaft bearings. They are packed in grease, multiple sealed. You'll also like the simple de-clutching arrangement on V-belt drive, 4 self-cleaning blades, optional rubber tips. Has 38-inch charging height, 29-inch width, all-welded frame. Kwik-Mix 6-P and 10-P sizes also available.

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Portable batch plant or cement transfer plant

Johnson Elevating Charger unloads cement from box cars or hopper-bottom cars, and loads into trucks. Charger has a 1000-lb. cement weigh batcher, hung under a 33-bbl. overhead storage hopper. Or, to charge dual-batch trucks, two 1000-lb. batchers can be used. It's easily changed to cement transfer plant by removing batchers, cone, and bolting a 50-bbl. extension section to the upper hopper. See your Johnson distributor.

C. S. JOHNSON • Champaign, Ill.
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Koehring ½-yd. hoe digs 17¾-feet deep

With long reach, Koehring ½-yard 205 hoe puts dirt far beyond edge of cut, or gives 8¾-foot clearance height to load trucks. Close-coupled dipper pulls up tight to the goose-neck boom, avoids spillage. Powerful cable crowd, fast line and swing speeds maintain big-yardage output. This heavy-duty 205 converts to ½-yard shovel, ½ to ¾-yard dragline or clamshell, 10-ton crane. On truck mounting the 205 has 15-ton lift capacity.

KOEHRING Company
Milwaukee 16, Wis.

V61



... for more details circle 228, page 16

Administrative Innovations to Conserve Engineering Manpower

First findings of a recent survey of time-saving methods in highway engineering are being compiled by the Highway Research Board. The study, which will run through 1956, is an attempt to learn how state highway departments are alleviating their engineering shortage by adopting time-saving techniques. Thirteen questionnaires, covering such areas as administration, planning, design, construction, maintenance and traffic engineering, have been returned by the highway departments. They indicate a wealth of experimentation with the problem.

The first installment of the study, which covers administration, reveals that 41 states have made organizational changes since 1950 that have increased operating efficiency. According to the Highway Research Board, such findings testify to marked progress in highway department administration.

The study will not be available for general distribution until all 13 installments have been written.

Engineering Jobs

(Continued from page 94)

tral staff is to help the field districts to do their job, not to do the job itself. All maintenance work, in addition, is a county function. Such a system does two things:

It eliminates duplication of engineering work on two levels, and it forces the districts to make their own engineering decisions — both important steps in the utilization of engineering manpower. Some state highway departments may take exception to such decentralization, but Wisconsin feels that districts strong in their own engineering know-how can deal most effectively with their own peculiar problems.

Out in the field, another step is being taken — the shift of semi-skilled duties from engineers to engineering aides. The department has its mind set on building up a corps of non-professionals who will take over most of the technical work load and relieve professional engineers of all but supervisory functions.

The Wisconsin attitude has been aired by William L. Hass, Director of Administration:

"It is well known that professional engineers with years of experience are holding sub-professional positions in highway departments. Many engineers falling into this category should be salvaged as rapidly as possible and moved into positions where their talent and skills can be used more profitably."

This has been carried to the ultimate in one district at least, where seven survey crews are operating with

only one engineer in the entire seven. That is about as far as the theory can be stretched, Mr. Haas believes, although a ratio of at least five to one should be the general goal.

"There may be a shortage of engineers, but there is a vast reservoir of men who can become skillful engineering and administrative aides," he said.

Wisconsin started to tap this reservoir in 1953 by recruiting 36 high school graduates for surveying and drafting work. The young men were given a quick but intensive formal training course at the University of Wisconsin of six weeks duration before being sent to the divisions. After 18 months of on-the-job training, all but one passed a promotional examination.

Program Accomplished

The program accomplished "exactly what was intended," officials declare, namely to provide "quickly and at moderate cost, reasonably skilled personnel who have relieved engineers of many tasks."

Such results have "sold" the Wisconsin Commission on the value of recruiting and training non-professionals. They feel it may be the only way to acquire skilled personnel these days. Now, a draftsman-trainee program has been launched to provide men who can relieve engineers in this work.

All this assistance on the non-professional level is steadily upgrading the department's engineers to more responsible work. Wisconsin feels it utilizes its engineers when they are acting in a supervisory capacity.

"To get the most out of our short supply of engineers, we will have to use them more and more in a supervisory capacity and support them to a much greater degree by technically-trained non-engineering personnel. Thus staffed, a single engineer can be expected to handle successfully two or more jobs rather than the traditional one job. Therein lies the greatest hope for extending and using effectively existing engineering manpower."

Last summer, this theory was tried on both construction and design work with "encouraging" results. In effect, instead of following the usual method of staffing a project with a high-level engineer and several supporting engineers, the engineer was placed in charge of several jobs in an area and supported with experienced engineering aides. Additional engineers were permitted only on the most complex projects or to provide new engineers with training under experienced supervision. The system worked well, the department reported, provided the men being supervised were not left alone too long or expected to make engineering decisions.

More Work, More Pay

Of course, such an arrangement is hard on engineers in a sense.

But while working its engineers harder on one hand, the department is seeking constantly to improve their lot. Newly created promotion opportunities have encouraged efficiency and boosted morale. In 1953, only three Grade Five positions existed in the 10 district offices. Under the new plan there are 40 such top jobs. Similar expansion of the lower classifications has multiplied the advancement opportunities. In the last two years, nearly 300 of the department's 403 engineers received promotions and more are scheduled. All of the engineers, including those promoted, have received merit increases which are given annually.

Moving engineers into more responsible jobs and offering them advancement opportunities is a most effective technique for getting the most out of a department's staff, the Wisconsin experience illustrated.

The proof of this pudding was proved recently when the commission advertised for 15 top-level engineers to fill vacancies caused by the expansion and retirement. More than 125 well-qualified engineers, in the midst of a shortage, applied for the jobs.

Better ways may be found in the future to beat the engineering shortage, but such measures will do until then, Wisconsin officials believe.



● Figure 1. Welded girder bridge in Province of Quebec, Canada, which has been in service for some 20 years at temperatures as low as 40° F. (Photo courtesy Dominion Bridge Company).

Design For Structural Welding

A Roads and Streets Technical Review

This authoratative review highlights the now maturing practice of structural welding from the standpoint of the designer and construction supervisor.

By La Motte Grover

Air Reduction Sales Company, New York, N. Y.

THE first step in any structural design is the selection of proper materials of construction — materials that are adequate for the service conditions of the structure, but not more costly than these conditions warrant.

Methods and procedures of fabrication and erection have a bearing upon design as well as upon the choice of materials. The three factors, design, materials and construction methods are interdependent. Provisions cannot be made for any one of these three without some assurance regarding the other two.

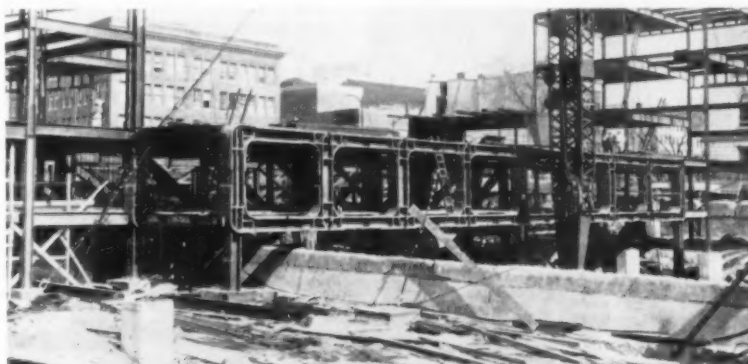
This assurance, is provided for welded construction by standard codes and specifications of the American Welding Society which prescribe certain ASTM specifications for structural steel material and electrodes. The AWS building code and bridge

specifications also include the essential provisions for details of design for welding and for welding procedures.

A new edition of the Bridge Specifications is now being printed. A current revision of the Building Code will be completed soon.

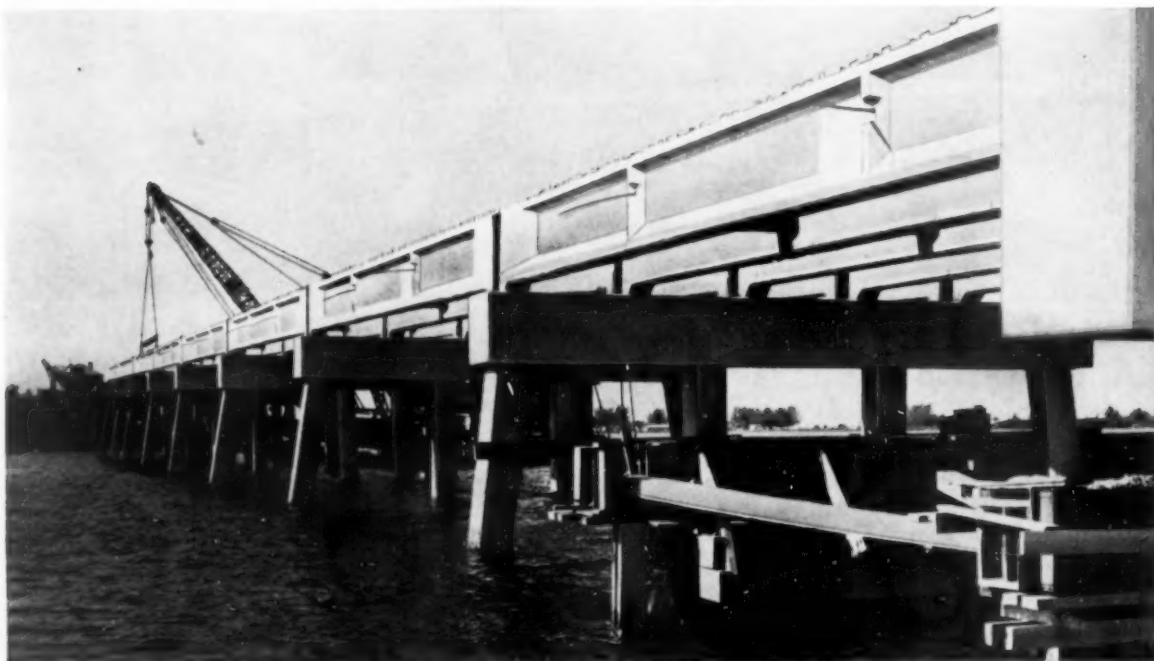
Close technical cooperation of organizations such as the Navy Department, The American Bureau of Shipping and the Bureau of Public Roads, results in quite good compatability of their requirements with the specifications of the American Welding Society.

(Continued on page 102)



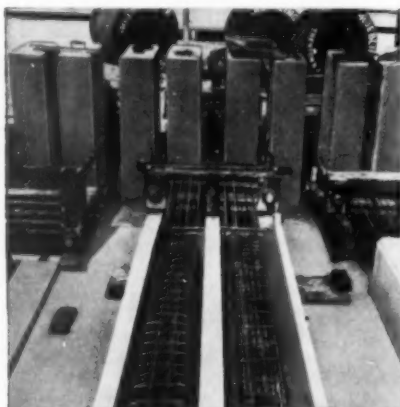
● Figure 2. Vierendeel trusses of new building in Hartford, Connecticut. (Photo Lehigh Structural Steel Co.).

STANDARDIZED PRESTRESSED BRIDGE MEMBERS PAY OFF IN FLORIDA



Cortez Bridge, near Sarasota, Florida. 50 spans at 48'-0", 24' roadways, two 5'-0" sidewalks. Six 3'-4" deep I girders per span, each stressed with nine $\frac{3}{8}$ " diameter Roebling 7-wire stress-relieved prestressed strands, and one post-tensioned Freyssinet cable using Roebling prestressed concrete wire. Poured-in-place deck slab forms

composite section with girders to carry live load. 20" square piles stressed with eighteen of Roebling's $\frac{3}{8}$ " diameter strands have maximum length of 62'. Prestressed members fabricated by Florida Prestressed Concrete Co., Inc. of Tampa, Florida. Erection by Bay Dredging and Construction Company.



Pouring square pre-tensioned piles for Turnpike Bridges at plant of R. H. Wright & Son, Ft. Lauderdale, Florida. Production at this plant is well along with a requirement for 600 pre-tensioned bridge girders and over 200,000 linear feet of pre-tensioned piling.

In a recent lecture before the Thirty-Fifth Annual Meeting of the Highway Research Board, Mr. W. E. Dean, Assistant State Highway Engineer of the State of Florida, reported the following facts concerning the use of prestressed concrete for bridges in his State:

Florida has established three standard pre-tensioned bonded prestressed concrete girder sections which accommodate all loadings and all span lengths from 25 to 60 feet.

Engineers of the Florida Turnpike Commission have adopted the State's standard girders as alternates for I beams on all bridges where they are applicable on the new Turnpike. To December 15, 1955 bids were received on 22 bridges with 35 to 55 foot spans. On 13 bridges the prestressed alternate was low, for a total saving of \$93,000. On the other nine the I beam alternate was not even bid.

On 10 typical projects let by the Florida State Road Department in 1954 and 1955 totaling 546 spans, prestressed concrete was lower than the I beam or reinforced alternate in each case.

Most of the prestressed bridges as well as many longer and shorter spans not of prestressed concrete are being supported on Florida's standard pre-tensioned bonded piles.

Roebling engineers will be glad to cooperate with you to help assure top results on any type of prestressed concrete application. Write Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING



Subsidiary of The Colorado Fuel and Iron Corporation

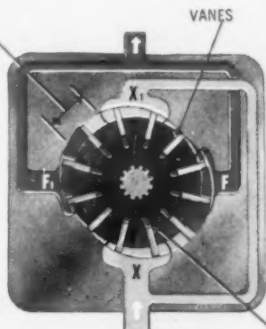


Question: Why are **VICKERS** Balanced Vane Pumps the most widely used oil hydraulic power pumps on mobile equipment?

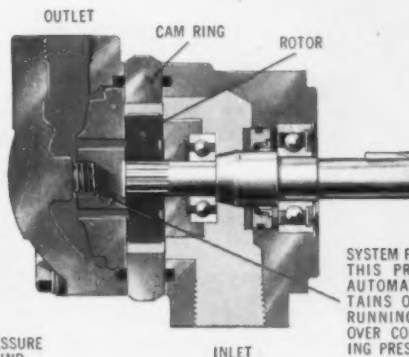
MILLIONS OF VICKERS VANE TYPE PUMPS ARE RUNNING EVERY DAY

TRUE CIRCLE ARCS BETWEEN PORTS PREVENT RADIAL VANE MOVEMENT WHILE PUMPING. LOAD IS IMPOSED UPON VANE

PUMPING PRESSURES WHICH WOULD OTHERWISE PRODUCE BEARING LOADS ARE CANCELLED OUT BY EQUAL AND OPPOSING PRESSURE AREAS (PORTS $F=F_1$ AND $X=X_1$)



WORKING PRESSURE IMPOSED BEHIND ALL VANES



Answer: Because of their SUPERIOR PERFORMANCE and MANY OTHER BENEFITS for the user.

For more than two decades, the Vickers Balanced Vane Type has held the leading position among hydraulic power pumps . . . growing steadily in popularity. The various models (only a few shown below) are the most widely used of all pumps in oil hydraulic service on mobile equipment.

The many advantages listed hereafter merit the thoughtful attention of anyone concerned with the selection and use of oil hydraulic pumps for construction, automotive, agricultural and materials handling equipment.

COMPLETE HYDRAULIC BALANCE—Each inlet and outlet port is balanced by another equal in size and radially opposite . . . pressure-induced bearing loads are thus eliminated.

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OPTIMUM RUNNING CLEARANCES—Both radial and axial clearances are automatically maintained over complete operating pressure range and throughout pump life.

FLOATING ROTOR DRIVE—Rotor is free to float, for correct centering and alignment, on a rigidly supported spline.

TRUE-CIRCLE CAM ARCS between ports prevent radial vane movement while pumping load is imposed upon vanes. Wear between vanes and rotor is thus practically eliminated.

EASIER COLD WEATHER STARTING—At normal engine starting speeds vanes are retracted . . . centrifugal force is insufficient to throw vanes outward into operating position . . . thus no pumping action takes place and pump drag on starting engine or motor is nonexistent. Only after engine starts is speed sufficient to extend vanes and begin pumping.

GREATER INSTALLATION ADAPTABILITY—Various types of mountings and four optional positions of pressure outlet connection. By unbolting and rotating pump head, the outlet can be placed parallel, opposite to or at a right angle in either direction to inlet. Shaft drive is in either direction depending only on internal assembly. Pump can be driven by belt, chain, gear or directly coupled.

HIGHER EFFICIENCY—Tests prove exceptionally high volumetric and overall efficiency . . . not only when pump is new but also after long service.

AUTOMATIC WEAR COMPENSATION—Vanes are held in contact with the cam ring by centrifugal force and hydraulic pressure. If wear occurs, vanes revolve in a slightly larger orbit without appreciable change in performance.

TEMPERATURE ADAPTABILITY—Correct running clearances are automatically maintained which compensate for wide variation in oil viscosity resulting from temperature variation.

MINIMUM MAINTENANCE—Hydraulic balance . . . optimum running clearances . . . floating rotor drive . . . automatic wear compensation eliminate the most important causes for maintenance and repair.

LONGER LIFE—The numerous features mentioned above that keep down maintenance also contribute to longer life.

COMPACT—These pumps occupy very little space in proportion to their capacities.

CONSTRUCTION SIMPLICITY is evident from the illustrations above. This simplicity is another reason for the superiority of Vickers Vane Pumps. For further information, ask for Bulletin M-5101.

Single pump available in five basic case sizes having 15 normal delivery ratings. Operating pressures to 1500 psi (two largest units to 1000 psi).

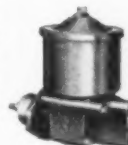


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Double pump for operating two independent hydraulic circuits from one power source. Available in 38 combinations. Operating pressures to 1500 psi (two largest units to 1000 psi).

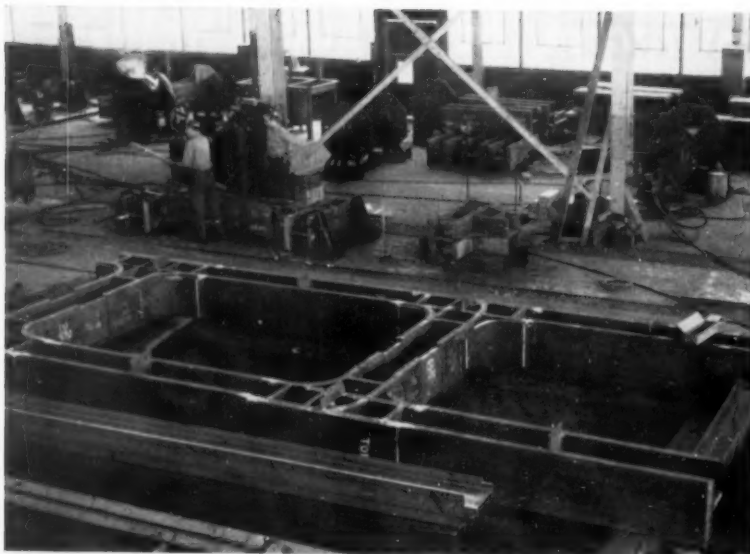


"Package" type pump with integral volume control and relief valve, and oil reservoir; also available without oil reservoir. See Bulletin M-5107. (This pump only.)



ALL MODELS HAVE THE VICKERS ADVANTAGES MENTIONED ABOVE

7353



● Figure 3. Fabrication of one of Vierendeel truss. (Lehigh Structural Steel Co.).

Structural Welding

(Continued from page 99)

Experience and research indicate that the problem of the bridge engineer or the structural engineer in choosing structural steel materials, is somewhat different from that involved in heavy plate construction. Apart from differences in service temperatures for various applications, the principal difference appears to be one of geometric shape and proportions, which influence stress distribution and the degree of restraint against ductile behavior.

For example, it surely appears that only very unusual bridge or building applications or details would require as tough a steel as that meeting the recently imposed special requirements for structural steel of thicknesses greater than 1½ in. for use in hulls of merchant ships.

Structural Steel Materials

In writing standard specifications such as have been mentioned, or perhaps special provisions for some unusual case, one has a choice to make between some three or four stand-

ard ASTM specifications for structural steel materials. His choice will depend mainly upon the thickness of material involved, the type of construction and service conditions such as lowest service temperature and the kind of loading — static or dynamic.

It is becoming widely realized now in engineering circles that more toughness is required of a steel material that must serve at comparatively low atmospheric temperatures.

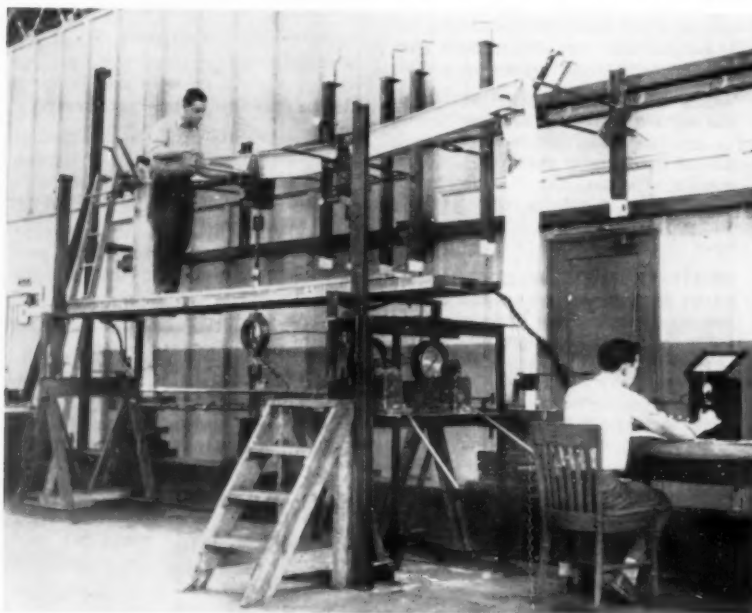
Also, it is now quite well recognized that any fabrication operation, such as punching, shearing, bending, flanging, drilling, welding, rough manual oxygen cutting and even rough machining, inevitably introduces local notch effects in a steel structure. Shearing and punching are especially drastic in their deleterious effects.

Among the choices of materials, there is first the well known ASTM-A7 structural steel that has been used for many years for both welded and riveted construction. It has an excellent record, but not a spotless one, when one considers service conditions for bridges serving at temperatures of —30 or —40 Deg. F. in some of our Northern states.

For example, serious fractures occurred in the trusses of a large riveted highway bridge not long ago. A more detailed discussion of this occurrence may be found in the 1955 Adams Lecture (published in the Journal of the American Welding Society). With no provisions for control over carbon and manganese, the adequacy of the A-7 specification has come to be questioned for service conditions of this kind especially in cold climates.

To provide a greater margin of safety under such conditions, especially when comparatively thick material is involved and other more exacting conditions prevail, two newer ASTM structural steel specifications are now available with quite complete provisions regarding chemistry (Table I) — A373 called structural steel for welding, and A131, structural steel for ships.* These two are quite comparable in price and quality, but with somewhat more favorable chemistry for the ship steel.

It is expected that the old A-7 steel will be continued in use for nearly all building construction where loads are substantially static, and where low temperatures are not encountered after the structure has been put in service, and when only moderate thicknesses of material are involved. The A373 specification will probably be used for



● Figure 4. Test of rigid frame at Lehigh University, to develop information on the theory of plastic analysis.

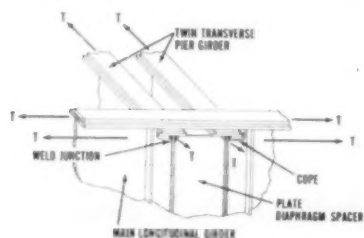
*The current ASTM Specification, A131-53T, does not include the aforementioned special requirements for material exceeding 1½-in. thickness.

some applications where relatively great thicknesses of material are involved, or very unusual service conditions are anticipated.

The new edition of the AWS bridge specifications calls for the newer A373 steel to be used for all new bridge construction, in view of the more severe service conditions than in ordinary building frames. It is quite possible that some of the state highway departments and municipalities will still use a good deal of A-7 steel, especially for smaller bridges in warmer parts of the country. Welded bridges constructed of A-7 steel have been in service now for periods up to 20 years at locations in the United States and Canada where temperatures drop below -40 deg. F. (Fig. 1).

The maximum thickness of material covered by A373 is 4 in. Although no maximum is stated for the A131 ship steel, some of the mills consider it as intended to cover no material thicker than about 2 in.

Some of the flange plates in the recently constructed 104-ft. span 9-4-

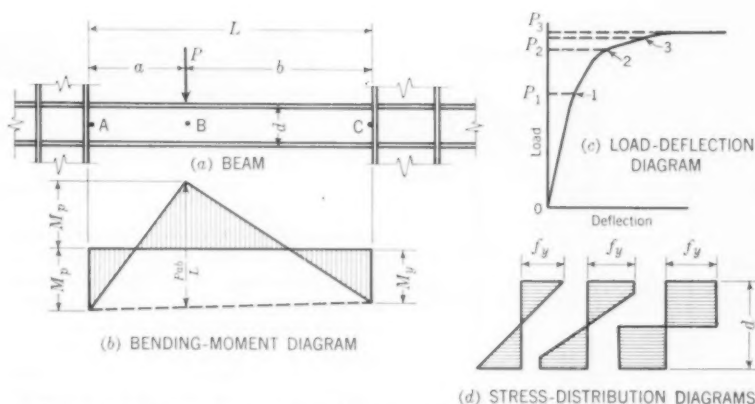


● Figure 6. Details of highway overpass structure at Junction of continuous girders and pier beam.

ton welded Vierendeel trusses of Fig. 2 exceeded 4 in. The material was ordered to conform to ASTM specification A284, Grade D. The chemistry requirements of this specification are not as favorable as those of A373. If mill tests show carbon close to the upper limits of this specification, it may be advisable to revise welding procedures accordingly.

Apart from the very thick material involved, there is another reason for using a specification with better control over chemistry than the A-7 steel specification, for very heavy Vierendeel trusses of this kind (Fig. 3). The nature and proportions of the built-up sections and their joints or connections are such that they involve quite a good deal of constraint against ductile behavior. Therefore, the use of a tougher steel is advisable, than would be required for ordinary, comparatively light and simple steel building frames.

This discussion of materials may



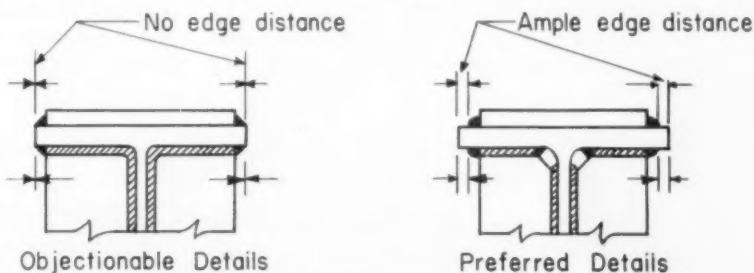
● Figure 5. Sketch to illustrate the mechanism of the simple plastic theory of design. Plastic hinges occur successively at points A and B. Failure does not occur until bending stress at C reaches yield strength, at load P_3 .

seem disproportionately great in paper on design. However, there are certainly some limitations upon design that would have to be imposed — and costly ones, at that — if less suitable materials were to be used.

Special Design Aspects

Conventional methods of structural analysis and design are, in general, the same for welding, riveting and bolting. However, there are some important differences. One of the most important of these is the greater inherent rigidity and constraint involved in some of the details used in special welded structures designed for the best economy. Often they are involved in improved and more economical types of design to meet special requirements for arrangement or clearance such as these Vierendeel trusses, which would not be feasible for any construction other than welding.

The designer accustomed to riveted work encounters few special problems in conventional beam and column construction, with perhaps some light trusses and girders, all designed as simply supported with so-called hinged ends. He simply figures stresses on the throat sections of welds and base metal instead of figuring shearing and bearing stresses on rivets and net sections of base metal.

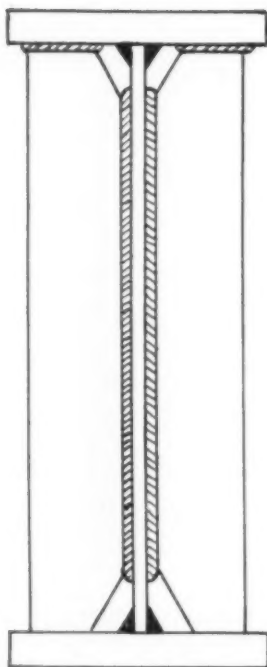


● Figure 7. Rolled steel beam with corners of stiffeners clipped and with welded cover plates.

It is true that the effects of eccentricities involved in certain common types of details, such as beam-end connections, are often recognized in welded design, even though they are ignored in riveted design. This is partly due to our having more test data for welded connections than for other types.

Further, the greater compactness of welded connections results in a saving of connection material, and special types of flexible connections can often be used to better the economy. Also fabrication and erection costs are often reduced. Nevertheless, the fundamental principles and assumptions used in proportioning such connections are much the same as those in common use for riveted and bolted connections.

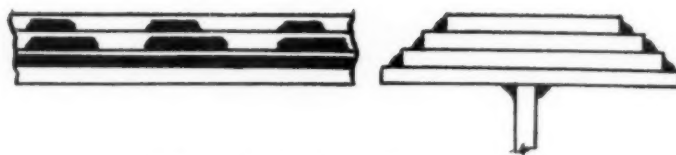
On the other hand, welding is opening up new opportunities for economy in steel construction, such as applications of the plastic theory of analysis based upon the true ultimate load capacity of rigid frames and other types of continuous construction. Here, welded details and connections, with their greater inherent rigidity and compactness, and calculable degree of rigidity, permit the design assumptions to be much more accurately realized. This really justifies a reduced safety factor, but there is



● Figure 8. Cross-section of welded girders showing corners of stiffeners.

an attractive cost advantage even without such a reduction.

Research at Lehigh University (Fig. 4) into this method of analysis



● Figure 10. Excessive number of cover plates.

has permitted the formulation of practical and reliable rules of design to take advantage of the very important saving in cost that can be made by using this method.

When this method is applied to beam and column construction where fairly heavy wind bracing is required, one might say it really amounts to a recognition of what actually happens at the ends of beams anyway. Plastic "hinges" occur at the beam-ends, even though they are not recognized in conventional design, which assumes freely hinged ends.

In continuous frames that are rationally designed by the plastic theory, the actual behavior conforms more closely to the design assumptions, as demonstrated by research, and the plastic deformations often are actually less than they are in some structures designed as simply supported. This is because the connections are designed to provide a definite resistance to the inevitable end moments, which oc-

cur at heavy end connections, whether they are recognized or not.

In advanced stages of loading of continuous frames designed by this method, plastic "hinges" occur, successively, at the various locations of maximum bending stress, thus redistributing bending moments to other less highly stressed portions or locations in the structure. (Fig. 5). The maximum useful moment capacity is therefore utilized at more locations. A balanced design results, and the material is therefore utilized more efficiently. It is only by the use of welding that the economic benefits of this method can be fully realized.

Details of Design

Ironically, this same inherent rigidity of welded details and connections, which is a great asset when properly assessed and utilized, can result in difficulties when it is improperly introduced into structural details. Of

"24 Years of Complete Satisfaction with Barnes Pumps—They've got to be good!"



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EQUIPMENT COMPANY
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Industrial and
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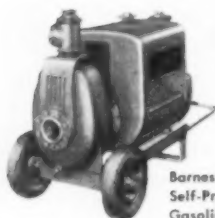


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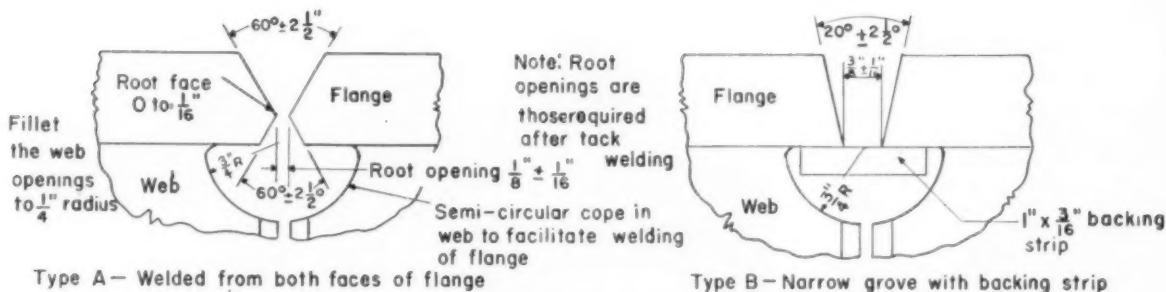
Mansfield, Ohio

Oakland 21, Calif.

forward action in '56



. . . for more details circle 186, page 16



NOTE: Extension bars to be provided at both ends of each flange weld. Extensions to be removed after welding and ends of welds to be made smooth and flush with edges of flanges.

● Figure 9. Coped hole in web of beam with welded splice.

course, in such cases, it is done inadvertently. The designer of large welded members, especially in the case of continuous construction, must be on the alert to avoid extreme degree of biaxial constraint or concentration of stress that might result from the rigidity of direct welded connections and other details of design for heavy members.

For example, the structural arrangement for a highway grade separation project involved intersections of continuous main girders and transverse pier girders as shown in Fig. 6. Due to negative bending moments in both girders, tension stresses exist in both directions in the top portions at the intersection.

To avoid biaxial tension in the top flanges, they were separated as shown. However, a plate diaphragm or spacer between the twin transverse pier girders actually functioned as a continuation of the web of the longitudinal girder. Thus, the webs did intersect, in effect, resulting in high biaxial tension at the top of the web intersection.

If the diaphragm-spacer and its welded connections had been detailed to provide a slight amount of flexibility, this would have relieved the concentration of biaxial stress and the high degree of local constraint at the upper part of the web-intersection.

To make matters worse, the copes in the webs of the longitudinal girders were not made deep enough to keep the vertical fillet welds from intersecting with the longitudinal fillet welds. Thus, even further restraint was introduced, and some undercutting occurred, almost inevitably, where the vertical fillets were returned across the thickness of the coped web.

After the bridge had been in service some time, a fracture was discovered, which had started at the above described weld junction in the field of high biaxial stress and re-

(Continued on page 108)



on CARAVAN AXLES

Wherever construction is in progress . . . the mobile equipment probably will be mounted on Caravan axles. These quality-built assemblies assure positive trail at high speeds as well as stability for heavy equipment over the roughest ground.

Caravan axles are available as single-axle two-wheel assemblies and as four-wheel running gear

equipped with automotive type steering mechanism and adjustable camber, caster and toe-in. They are recommended for mounting military and industrial equipment as well as field service and construction machinery weighing up to 20,000 lbs.

Write today for the new Bulletin No. 53 for further information.



The Big Slide

(Continued from page 56)

question was, "Will the next shovelful uncover an automobile and bodies?" Police checked and rechecked for reports of missing persons. Patrolmen interviewed motorists who stopped just short of the slide. They reported that traffic had been normally heavy, and that the slide had roared down without warning. There was too much dust and confusion to see ahead. Newspaper stories picked up the ominous tone. It was inconceivable that the highway could have been free of traffic when the slide let go.

Deeper and deeper into the slide the power shovels ate their way. Automobiles were not found. By the following Thursday the entire toe had been cleaned away, so that one-way traffic could be restored. Traffic was alternated every 12 hours, using the detour route for opposite-bound traffic. Two shifts, 12 hours each, worked around the clock. The First Methodist Church of Santa Monica and the Red Cross set up a coffee-doughnut stand. A week after the slide, the last big chunk of loose material in the central portion was cleared away. Now the miracle was certain. Not a single motorist had been trapped in the slide!

A 10-day Deadline

The end of the 10-day deadline was February 13. At 4 p.m. on February 12, 225,000 cu. yd. had been moved. The last remaining dirt was loaded and hauled away to the earth-fill jetty, already eroding rapidly under the Pacific's undercurrents. The emergency was over.

Now that officials have had a



● Assistant director L. C. Jones, director Ben R. Paris, and general superintendent L. N. Hoefs, of the Los Angeles department of street maintenance, study photographs of slide to plan how to handle the next one better.

chance to look at the job in retrospect, some tributes to modern equipment and to good organization in a maintenance department deserve to be paid. First and probably most important, each operator and truck driver was trained in safety to the point where not a single accident occurred. Production-wise, the machines also gave excellent accounts of themselves. In the 200-hour sustained run, one shovel broke a hoist cable on the 9th day. One tractor broke a track and was out of the line for about 4 hours. There were no other breakdowns despite the emergency nature of the work. And earthmoving production averaged about what would be expected of each piece of equipment if it had been assigned to a modern contract job.

Immediately to the south of the

big slide area, new movements are beginning anew. Crack patterns have developed along the top of the slope, and the highway far below has again begun to buckle in a few places. The department is now building a temporary asphalt-surfaced detour oceanward of the old highway. But if worst comes to worst, and a new slide again plunges hundreds of thousands of tons of material down, maintenance men have new confidence. They have proved that a sound organization with skilled men, with enough modern equipment thrown into an emergency, can make short work of big yardage.

Full sized bridge being tested to destruction

Construction has begun on a full-sized bridge, designed for experimental studies and eventual testing to destruction. Located at Evanston, Illinois, the structure is part of a project to be conducted by the Civil Engineering Department of Northwestern Technological Institute, with financial support from the Association of American Railroads, the Department of the Army, and the Bureau of Public Roads.

The cost is said to be ultimately \$250,000 for the bridge which involves a single 100-ft. span and 20-ft. deck. Lawrence T. Wily, Research Professor of Civil Engineering at the Institute, is director of the project.

● Covered wooden bridges numbering 142 still exist on Pennsylvania's highway system, reduced from 359 since World War II by floods, gales and old age.



● Northwest Model 6 loads material at toe of slide.



When these pictures were taken, machines were working in very cramped quarters to level a road through the school grounds. Making a narrow cross-wise cut, Tournapulls had to back into a 161-hp crawler to be push-loaded. In about 100', Tournapull loads 10 yards of sand and clay in 55 seconds. This high school, being built by the Jefferson Union High School District, will serve a new community of more than 13,000 people.



Tournapull spreads its 10 yard load of sand and clay over a 100' strip as it levels grounds for Westmoor High. Two LeTourneau-Westinghouse sheepsfoot rollers, towed by 155-hp crawlers, helped to compact fills, some as deep as 42'.

Move 300,000 yards to level 45 acres in 45 working days

Robert A. Farish, South San Francisco, California, had 45 acres of land to level in Daly City for the Westmoor High School building and grounds. To bring land to grade, 300,000 cubic yards of sand mixed with some clay had to be moved...fills deep as 42' had to be constructed.

Important in the Farish equipment fleet that handled the job were 3 C Tournapulls. These self-powered scrapers, working 45 hours a week, for two months, hauled 1/3 of the yardage. Three self-powered and 3 tractor-drawn, 20-yd. scrapers moved the rest.

When these pictures were taken, job was all but completed, and Tournapulls were cutting a road through the area...hauling spoil for 1200', including about 400' up an 8% grade, spreading material to raise low spots.

2600' cycles take 5 1/4 minutes

Each "C" completed a 2600-foot cycle, over roads of compacted sand fill, every 5 1/4 minutes. On shorter 800' one-way hauls, each Tournapull delivered 12 loads, of about 10 yards each, every hour, estimates Boyd R. Cable, Superintendent on the job.

"Tournapulls have been working out fine," Says Owner Robert Farish.

"They have a good power plant," adds Superintendent Cable.

Referring to the continually wet weather in this coastal fog belt (the sun shone only three days while this job was in progress), Superintendent Cable says, "Tournapulls are maneuverable. You get wet weather and you have to park the others—but 'C's' keep right on working."

Built for operator comfort

Operators particularly like the many comfort features built into Tournapulls...the air-foam cushioned seat...the big, low-pressure tires that absorb much of the shocks and jars of travel over rough ground...the convenient dashboard location of "push-button" controls.

Operator Glenn Ward says, "I've been moving dirt 28 years and these are nice to run. They don't wear you out. Seat fits your back — no back trouble with these."

95% efficient in 8,000 hours

The three "C's" on this job have also handled numerous jobs for contractor Farish, including 750,000 yards for a housing project at El Sobrante,



and 170,000 yards in an earthmoving project at West View. In a combined total of more than 8,000 hours of work, the three "C's" have been 95% mechanically efficient.

Before you bid your next job, ask to see figures on Tournapulls. Their speed (up to 30 mph), short turn radius (15 feet), and versatility (same prime-mover powers rear-dump, bottom-dump, crane, and flat-bed trailing units) can be important factors in cutting your costs.

Tournapull—Trademark Reg. U.S. Pat. Off. P-909-B-b



LeTourneau-WESTINGHOUSE Company

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Structural Welding

(Continued from page 105)

straint. The fracture no doubt occurred during sub-zero temperatures.

However, even this unfavorable detail of design apparently constituted a marginal case for the steel material and temperatures involved, in which the probability of fracture was not very great. A careful inspection of quite a number of similar details on the same bridge revealed no other fractures.

A similar but usually less severe condition of biaxial tension stress and restraint can occur at points of negative bending moment near the piers of a continuous girder bridge, when transverse floor beams and cantilever brackets frame directly into the upper portions of the main longitudinal girders.

In such cases the top or tension flanges of the transverse beams and brackets may be spliced by means of straps, to separate the tension flanges of the intersecting members, and thus avoid a condition of biaxial stress and constraint. The use of lap joints at such straps involves fillet welds on the tension flange of the floor beam. They reduce fatigue resistance, just as rivet or bolts holes do. When fatigue resistance is an important factor, a butt welded splice is better between the strap and the flanges of the transverse members.

It has been found advisable to clip the corners of floor beam webs or stiffeners at such locations in the same manner as the corners of other stiffeners are clipped. (Fig. 7.)

Clipping Corners

In Fig. 7, the clipping of the corners of the stiffeners is hardly adequate—really just sufficient to facilitate fitting. In the case of a built-up girder with flanges fillet welded to the web, the corners of the stiffeners are usually clipped enough to permit the transverse fillet welds to clear the longitudinal fillets. (Fig. 8).

Where cover plates are used to reinforce rolled beams (Fig. 7), ample edge distance should be provided to prevent scarring or scalloping the outer edges of the main flange.

The ends of cover plates or splice straps should be continuously welded for the best fatigue resistance. Elongating the end fillets helps but it is more important to blend their toes smoothly into the surface of the flange, for good fatigue resistance. It is also important to make the end fillets of adequate size, at least the

minimum size permitted for the thickness of material involved.

Fatigue tests have shown that square ends of cover plates are better than ends with a long taper. However, it requires special attention to carry fillet weld returns full size and continuously around a square corner without breaking the arc and introducing some porosity or lack of soundness, or reduction in weld size. Rounding these corners has been done sometimes to facilitate sound welding. Where fatigue resistance is very important, the toes of the fillet welds at the ends of the cover plates may be smoothed locally with a rotary file in a portable drill. Contrary to what has been said sometimes about such operations being unduly meticulous and costly, a small amount of such finishing operations at critical points does not add much to the cost of a job. When service conditions warrant it, the small additional cost is money well spent.

Detailing Joints

In detailing welded joints and connections, it is very important to show an arrangement that will permit access for the welder to manipulate the electrode in the proper manner to produce sound welds—not forgetting that he wears a helmet and should be in a position to see what he is doing.

Also, it should be remembered that it is impossible to deposit a sound weld over sizable gaps or voids.

For a good many years it has been quite common practice to provide coped holes in the webs of beams and girders adjacent to splices. (Fig. 9). The holes are introduced to facilitate the making of sound butt welds in the flange.

When this detail is used, it is advisable to enlarge the coped hole as indicated in Fig. 9, after the web-splice butt weld has been completed, thereby removing the defects that are almost unavoidable at the terminations of a butt weld.

The coped hole, of course, constitutes a stress raiser, just as a rivet or bolt hole would cause stress concentrations, but has been considered that this would be less objectionable in the web than in the extreme fibres of the flanges.

However, low-temperatures impact tests made at Columbia University, for a project of the Welding Research Council, have shown that these coped holes lower substantially the resistance of a spliced beam to severe low temperature impact. Fatigue tests now being made in another WRC project at the University of Illinois, seem to

indicate that such holes also lower fatigue resistance somewhat.

Beams spliced by a special, somewhat more costly procedure to eliminate these holes, and tested at Columbia University under severe impact, showed a transition temperature to brittle failure that was 70°F. lower than for beams with coped holes. The additional cost of such a procedure would be warranted for a railroad bridge that is to serve in a very cold climate, provided that rivet and bolt holes and other rather severe stress raisers were also eliminated from the structure, especially at critical points.

It is well known that welding can be done faster and at less cost when details are arranged to facilitate downhand welding (flat position welding or horizontal fillet welds). Sometimes members can be reoriented from the arrangement commonly used in riveted work, to permit most of the shop welding to be done downhand without special handling and positioning.

A designer who is familiar with riveted work must keep in mind some of the fundamental differences between welding and riveting if he is to detail economical welded members. For example excessive cost of welding would result from making a welded girder similar to a riveted one with multiple cover plates. (Fig. 10). Also, better fatigue resistance results from the use of only one flange plate with a reasonable number of butt welded splices at points where the plate thickness can be reduced. The cost of making a welded splice in a cover plate at any point must be weighed against the value of the material saved by reducing the plate thickness.

One of the most common mistakes made by an inexperienced designer is to show more welding than is required and to feel that he is playing safe by using over-size fillet welds. This is not only wasteful of weld metal but it can often cause distortion that is costly to remove. Further, excessive welding can be objectionable from a technical viewpoint. It can create unfavorable geometric shape and restraint, and lower fatigue resistance or create notch effects that tend to cause brittle behavior.

Residual Stresses

Finally, no paper on welded design would be complete without some mention of residual stresses.

It is axiomatic that in the complete absence of ductility, even localized residual stresses resulting from weld-

(Continued on page 110)



Wide range of working speeds mean fast pick-up of roadside oil-mix windrows. Material is loaded at "truck-a-minute" rate. Traveloader then moves to next job at speeds to 26 mph.

"Better range of speeds for loading"

says County Road Commissioner

Comparing the Adams Traveloader with other self-loaders, M. J. Roidt, highway commissioner for Vernon County, Wisconsin, says, "I have found it has a better range of speeds for loading and for traveling."

Vernon County in Southwest Wisconsin, operates two Traveloaders and keeps them busy the year 'round. In summer they are used largely to load dirt, sod, rock, and for loading oil-mix for highway repair jobs. In winter they load snow to keep roads and streets clean and safe.

Wide range of working speeds keep Traveloader working to capacity

On any type of loading assignment, Traveloader's wide range of working speeds from 0.29 to 1.9 mph make it possible to load materials at most efficient rate. Travel speeds to 26.7 mph move rig quickly from one job to another at comfortable traffic speeds.

High-position of cab on Traveloader, well out of the dust area, gives operator good visibility in all directions. He can watch the action of feeder and belt,

and adjust travel speeds for maximum production while unit is moving.

Loads to 10 cu. yds. per min.

Machine handles all kinds of belt-loaded materials...sod, top soil, dirt, sand, bituminous-mix, gravel, slag, cinders, scarified black top, etc. Loads from windrow or stockpile at rates to 10 cu. yds. per minute. In winter, it loads snow from bank or windrow up to 20 cu. yds. per minute. Loading is faster than with front-end loaders because there is no non-productive lost motion. Loading is continuous.

Feeder and moldboard on the Traveloader pick up materials to a width of 8 feet. Curved screws on sides of feeder move materials into revolving paddles which convey materials...feeder-pan to belt. Replaceable cutting-teeth on screws cut up sod and chunky-material for easier handling and maximum truck loads with minimum of voids. Feeder is free to "float" and adjust itself to change in bank or windrow. Shoes on moldboard are adjustable for clean pick-up of all kinds of materials.

A heavy, all-welded, truss-type main-frame extends from front to rear, forms a sturdy, one-piece foundation for the power unit, conveyor, feeder, running gear, cab, and controls. This rigid frame provides a stable foundation of great strength; insures a dependable, smooth-working machine with minimum of control adjustments and maintenance problems to cause downtime.

Investigate need for a Traveloader in your operations. Your LeTourneau-Westinghouse dealer will show you more facts and figures on Traveloader's fast-loading, money-saving advantages.



Good visibility from high cab of Traveloader gives operator better control of machine for both travel and work. Conveyed material is loaded accurately into any size truck.

AL-12-P-b

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Also Presstite No. 77
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Exclusively Since 1924

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St. Louis 10, Missouri

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Structural Welding

(Continued from page 108)

ing could be additive to load stresses and premature failure by fracture.

Many attempts have been made to demonstrate such an effect of residual stresses in large scale tests as well as small specimen tests. Surely none of these has shown any conclusive evidence that this can occur under the service conditions of an engineering structure.

Some of the most conclusive tests which indicate that such residual stresses are not an important factor, were made for the Structural Steel Committee of the Welding Research Council at the National Bureau of Standards several years ago. Several large box girders of thick material were tested to destruction at various temperatures of testing, down to -30°F .

In all of the tests sufficient deformation occurred well before failure to iron out the residual stresses.

By means of trepanning plugs with strain gauges mounted on them, the residual stresses were determined in a girder similar to those tested. They were found to be quite wide-spread, possibly accentuated by deliberately using a sequence of welding.

Yet the deformations measured during the tests indicated that residual stresses could not have been an important contributing factor to failure. The girders failed at calculated stresses close to the ultimate strength of the material. (Failure by buckling was precluded largely by the box girder design.)

A vast amount of information on the behavior of welded steel structures has been developed during the last 15 years by research costing several million dollars, as well as from extensive surveys of the results of experience. Although much of this work has been directed particularly toward solving problems in shipbuilding and other types of plate construction, a tremendous amount of fundamental information has been made available, which can be applied to bridges and building construction, with appropriate allowances for differences in geometric shape and size and in service conditions.

Such adaptation and correlation has been facilitated by the splendid experience records of welded bridges and building frames, together with tests of realistic prototypes of large welded members and connections.

Thus a basis has been established for continually expanding the use of structural welding to larger and more important steel structures.

Speed and Mobility

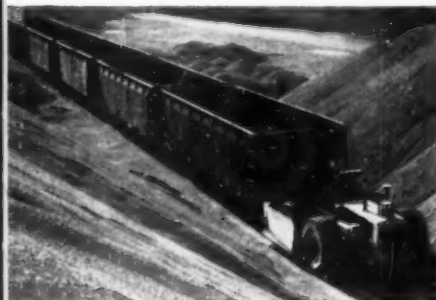
get more work done!



Tournatractor takes the shortest route to job ... via highway or cross country... cuts hours from job-to-job moves.



208 hp Tournatractor with PCU on rear can be hooked up to pull scrapers, rosters, and rollers.



Rubber tires do not damage rails or ties... unit can switch up to 10 fully-loaded railroad cars at once.

Whenever your application involves scattered job assignments, Tournatractor's 19 mph forward speed and extreme maneuverability cuts moving costs and reduces the non-pay hours of moving time. Big, low-pressure tires let you drive Tournatractor anywhere. For long moves, you save time, bother, and expense of locating a trailer, moving in extra manpower and transport equipment, loading and unloading.

Speed on the job

Tournatractor pulls, dozes, pushes at working speeds 2 to 3 times faster than crawler tractors. You have 3.69 mph in second gear, 8.38 mph in third, compared to crawler speeds of around 2 mph in second, and 3 mph in third. Tournatractor travel speed of 19.23 mph compares to the crawlers' top ranges of 4 to 6 mph. You change gears instantly ... waste no time shifting.

8 mph reverse speed

High reverse speeds give a very important time-saving advantage to tractor-on-rubber. Nearly 50% of your working cycle on dozing or pushing jobs is usually spent backing up. Tournatractor's reverse speed cuts crawler backing up time by almost 25 to 50%. Crawler highs in reverse range from 3.1 to 6.2 mph. Tournatractor high in reverse is 8 mph.

Instant shifting

Constant-mesh transmission aids high-speed performance by eliminating delays in changing gears... saving vital momentum... gives you any gear ratio instantly. Tournatractor works in higher gear ratios because there is no loss of momentum for shifting. Torque converter increases this advantage by giving you wide automatic over-lapping of gear ratios, without depending on operator to jockey levers to get the most effective ratio of power and speed to load.

Ample flotation and traction

2' wide tires stay on top of soft ground instead of digging in. Lugs bite into underfooting to give traction. Tire pressures as low as 20 lbs. absorb shock. Rolling action compacts loose materials far more effectively than crawlers.

Lower maintenance

There are 4 easy-rolling-wheel-assemblies as compared to more than 500 wearing parts in standard track-assemblies. This means less maintenance. Dollar-wise this reduction in maintenance time can mean a saving of \$3 per hour in operating expenses.

Easier to operate

Fingertip electric controls work at the flick of a switch. Steering, raising and lowering the blade, and operating the power-control-unit are all handled by buttons on dashboard. There are no levers, wheels, or other manual controls to handle. Big, low-pressure tires greatly reduce jars and jolts, stress and strain, on both operator and machine.

Interchangeable equipment

Adding to Tournatractor's versatility are a number of interchangeable attachments... Bulldozer, Angledozer, Root Rake, Snow Plow. This versatile tractor can also be equipped with a Push-Block, Logging-Winch or Tree-Pusher for additional applications. Drawbar and PCU are available for hauled equipment. Electric-control, open-top scrapers are also available for use with Tournatractors.

Find out for yourself how Tournatractor's go-anywhere mobility and 19 mph speeds can help you get more work done. Compare this rubber-tired tractor alongside your present crawlers. Write or call for a demonstration.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-926-G-b



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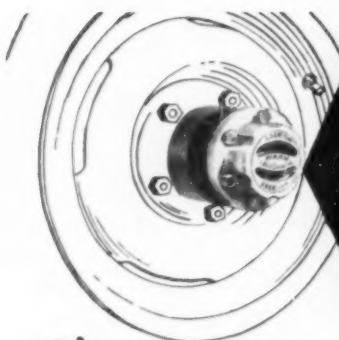
You can spray liquid Bituminous Materials (asphalt emulsions, cut backs, tar); Weed Killers, Insecticides, Water Proofing, Concrete Curing Material, Cleaning Solvents, Paints, Silicones. You can do BETTER WORK, FASTER and SAVE MONEY too with a TARCO Sprayer . . . because it sprays direct from your shipping barrel.

See your TARCO Dealer or write for complete details.

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**NOW! HERE'S
EVERYTHING
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New WARN LOCKOMATIC HUBS

Automatic

- FREE-WHEELING 2-WHEEL DRIVE
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- "SOLID" 4-WHEEL DRIVE FOR COMPRESSION BRAKING

MAKE 2 VEHICLES OUT OF 1

You know the advantages of 4-wheel drive. Now add drag-free, "free-wheeling" 2-wheel drive, and you have a vehicle just twice as useful—good for more trouble-free miles, and at a lot less cost for gas, tires and repairs! No gear whine or shimmy in 2-wheel drive, either—plus easier steering, plenty of pep and roadability. With Warn Hubs you can use your 4-wheel drive for all kinds of driving, on or off the highway. You have the drive you need automatically with Warn Lock-o-matics; through manual control with Warn Locking Hubs. Over 75,000 now in use around the world! Both models available for Willys, International, Dodge, Napco ½ to 1½ tons at authorized truck dealers. See your dealer today, or write:

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Riverton Box 6064—RS4
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Meetings Ahead

AMERICAN WELDING SOCIETY — annual spring meeting, Hotel Statler, Buffalo, N. Y.; Week of May 7.

PRESTRESSED CONCRETE INSTITUTE — Second Annual Convention, Hollywood Beach Hotel, Hollywood, Florida; May 16-18.

SCHOOL FOR HIGHWAY SUPERINTENDENTS — Cornell University, Ithaca, New York; June 18-20.

15TH ANNUAL SHORT COURSE ON ROAD-SIDE DEVELOPMENT — Ohio Department of Highways, Columbia, Ohio; October 2, 3, 4, 5.

AGC okays new mixes and pump standards

The Associated General Contractors of America through its Board of Governors approved revisions of the Concrete Mixer Standards and the Contractors Pump Standards at the organization's recent annual convention in New York City.

The proposals that the Concrete Mixer Standards incorporate six sizes of concrete mixers larger than 112S, not before standardized, and include, for the first time, four standard sizes of plaster and mortar mixers, were made by the Mixer Manufacturers Bureau, which has been affiliated with the AGC Cooperative Construction Bureau since 1924. This is the 22nd revision of the Concrete Mixer Standards.

The Contractors Pump Standards proposals definitely establish the principle of minimum standards for performance and also increase the minimum performance requirements for some pumps. This tenth revision of Contractors Pump Standards was proposed by the Contractors Pump Bureau, also affiliated with the AGC Cooperative Construction Bureau.

The AGC Board of Governors approved the revisions after receiving the recommendations of its Endorsements committee which examined the proposals. Charles S. Embrey, AGC assistant executive director, serves as secretary of both the Mixer Manufacturers Bureau and the Contractors Pump Bureau.

Pump Bureau officers include Paul W. Merritt, Essick Manufacturing Co., Los Angeles, chairman, and K. H. Cadigan, The Gorman-Rupp Co., Mansfield, Ohio, vice-chairman.

Mixer Bureau officers are J. S. Conway, Koehring Co., Milwaukee, chairman, and P. J. Foley, Worthington Corp., Concrete Machinery Divisions, Plainfield, N.J., vice-chairman.

"I like the Adams for its economy of operation,"
says sub-contractor Roy Preston, of San Diego



Shown above spreading sub-base material on a county road connecting Mt. Signal and Coyote Wells, Imperial County, California, Preston is working for prime contractor N. L. Basich, of South San Gabriel. The contract calls for 22.6 miles of grading and roadway-mix surfacing.

On this project, Roy Preston used his Adams 550 to pioneer haul roads, rip old asphaltic pavement, dig ditches, finish slopes, level sub-grade, and fine-grade before top surface was applied. Preston says, "I find there is substantial saving in fuel consumption with the Adams over other makes of motor graders, and maintenance and repairs are lower than any other I have used."

Adams does more work, in less time, at lowest cost

Let us prove it to you in actual demonstration! You can best see why this grader gets more work done when you watch the smoothness of a modern Adams at work. See how easily it picks up the load, how constant-mesh transmission shifts easily — with no clash of spur gears.

Eight forward speeds (1.4 to 25 mph) provide the necessary wide speed range to handle all operations at fastest practical rate with maxi-

mum power. Three additional "creeper speeds", optional (.23 to 1.82 mph), gear the grader down for accurate finishing in tight places, make it easy to penetrate rooty, rocky terrain, eliminate shock loads from machine. And 4 reverse speeds (1.8 to 13 mph) save time on shuttle-grading and mixing. *No other grader offers this wide range of speeds which enables Adams to do more work in less time, at lower cost.*

Make a date!

Accept our invitation to see a modern Adams in operation. Come see us, or let us take you on a field trip where

you can see these graders at work, talk to their owners, and ride a modern Adams yourself!

A size ADAMS for every need

Model 660

— 150 hp Diesel Engine, 27,730 lbs.

Model 550

— 123 hp Diesel Engine, 23,500 lbs.

Model 440

— 104 hp Diesel Engine, 21,500 lbs.

Model 330

— 80 hp Diesel Engine, 20,500 lbs.

TravelLoader—A high-speed, heavy-duty, self-propelled, belt-type loader for picking up and loading materials into trucks from windrows or stockpiles.



Leveling sub-grade in preparation for roadway-mix surfacing, Adams 550 holds grade to close

tolerance. With wide range of speeds, operator selects most practical speed for maximum power.

AG-24-G-b



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Oklahoma Builds Test Project to Compare

Normal-service durability and long-term maintenance in addition to first cost to be compared, utilizing comparable designs approved by the respective material associations.

A TEST ROAD, similar in some respects to an experimental highway under observation in Indiana, was completed in December, 1955, near Oklahoma City, Okla. This project, built by direction of the State Legislature, is a 4-lane dual highway incorporating parallel divided roadways of portland cement concrete and asphaltic concrete. Each type is represented by a pavement two traffic lanes wide by about 4 miles long.

The test construction is on a relocation of U. S. highways 66 and 77, extending north from the Witcher Interchange near the west entrance to the Turner Turnpike to a point about 3 miles east of the town of Edmond.

The project was initiated by a joint resolution of both Houses of the Oklahoma Legislature in May, 1953. This measure was entitled: "A Resolution authorizing the Oklahoma Highway Commission to conduct adequate and

conclusive tests of portland cement concrete pavement and asphaltic concrete pavement on an approximate four-mile parallel section of one of Oklahoma's heavily traveled roads."

The resolution specified that each of the test sections be "directly connecting and parallel so that said test road will have the same soil conditions, traffic, etc., in order to determine the durability, lasting qualities, first costs and surface maintenance costs under heavy truck and auto traffic." The resolution stipulated that the project was to be financed with regular state highway construction funds with approximately 50 percent Federal Aid participation.

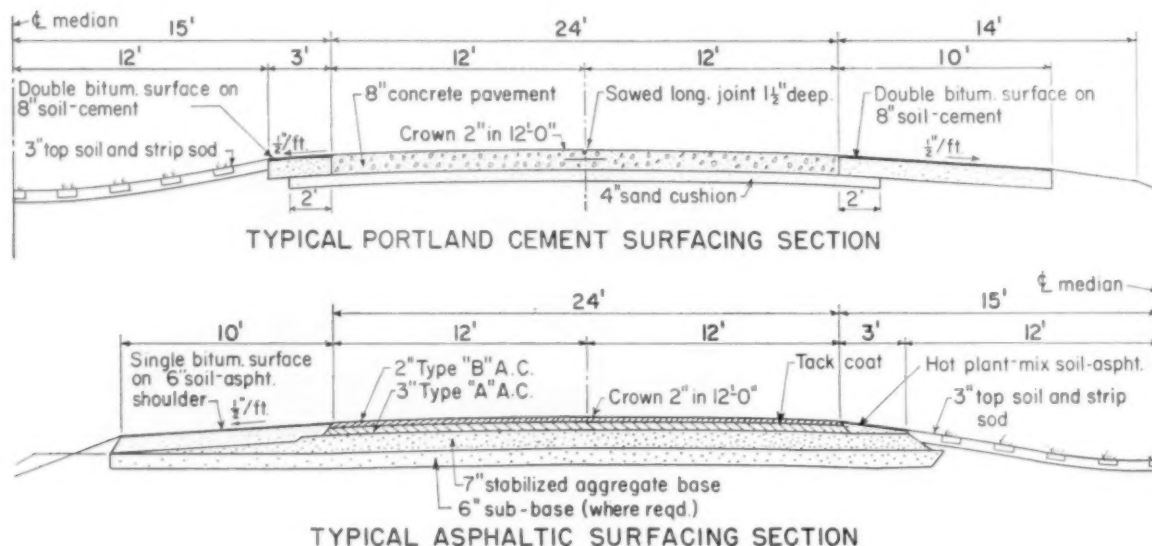
The measure further instructed the state highway department to make a detailed report on "the results, conclusions and recommendations" pertaining to the project to each succeeding session of the Legislature. The department of highways was also di-

rected to keep maintenance cost records, so as to determine surface maintenance costs separately.

Each House has appointed a committee of 15 citizens to receive progress reports. There is also a committee of five members of the House and five from the Senate to prepare reports for the Legislature and release information to the public.

Oklahoma's Highway System

Legislative dissatisfaction with Oklahoma's highway system and a desire to make the public aware of road problems are seen in the language of several paragraphs in the preamble to the Resolution. After reciting that the Legislature is in the process of writing a new highway program, the Resolution said that the Legislature would not feel that its job was complete without a review of the materials used for construction purposes. It also said: "There is a doubt in the minds of individual legislators as to the feasibility of continuing a construction program of asphalt or asphaltic concrete that because of tremendously high main-



● Pavement cross-sections for the two types represented in the Oklahoma test road; designed for identical wheel loads and approved by the material associations involved.

tenance expense will necessitate the expenditure of all monies allocated to the highway department. . ."

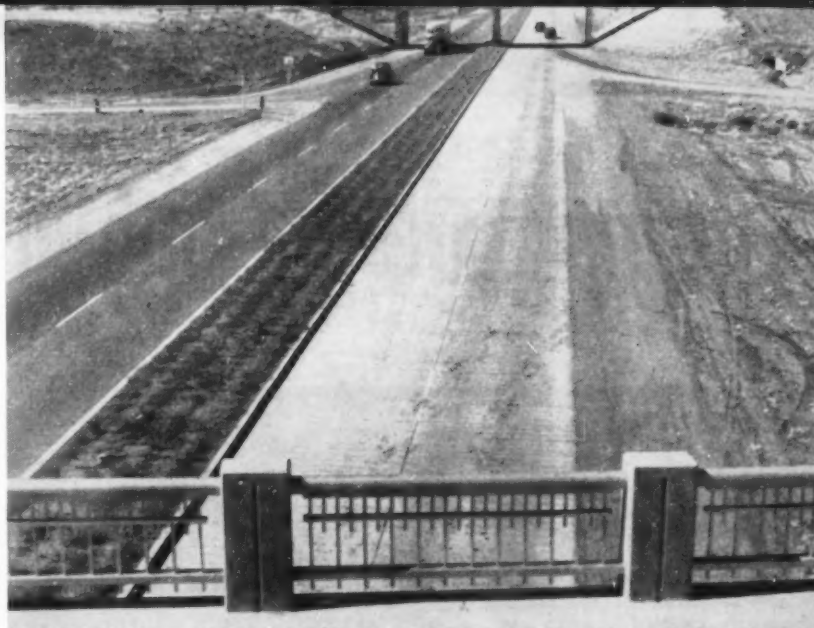
"The people of Oklahoma," the Resolution also said, "have come to the conclusion that because of high political influence in Oklahoma they are receiving an inferior type of road and losing the full value of the money they pay in taxes." The resolution then pointed to the desirability of a public test for educational purposes so that the public can "review the results and if necessary help alleviate present conditions and also have a stronger voice in formulating the policies of the highway department."

Roads and Streets Quoted

The first progress report to the Citizens' Committee was made September 18, 1953. This report included a full reprint from the November, 1952, issue of **ROADS AND STREETS** describing the Indiana experimental road project. The Oklahoma report recited the opinion of the Highway Commission that the site selected for the test road met all the requirements as to a heavy volume of traffic, with the additional advantage of being close enough to the state capitol to make it convenient for field inspections and investigations by interested groups. The report described general design features of the project as a 4-lane divided highway with dual 24-ft. wide pavements and a 30-ft. wide median strip. Stabilized 10-ft. wide outer and 3-ft. inner shoulders are incorporated in the design. Both the asphalt and the portland cement concrete pavements were designed for a minimum wheel load of 9,000 lb., but according to Report No. 3, issued by the department of highways in February, 1955, "Both types of pavement are adequate for 15,000 lb. wheel loads. . . ." Representatives of



● The test road is identified to the passing motorists by signs such as this one.



● Concrete on the right of the median, asphalt on the left — a 4-mile section was thus built for a comparative study of durability and economy of the pavement types.

both the Portland Cement Association and the Asphalt Institute reviewed and approved plans and specifications for test sections of their respective materials.

The subgrade soil under the project is chiefly granular, developed from Permian red bed sandstone. This material, found on or near the site, was used for subbases for both types of pavement. A compaction requirement of not less than 95 percent was specified, as determined by the AASHO standard method of test, but the dry density found in 553 tests averaged 98 percent.

Grading Costs \$273,900

Contract for grading and drainage was awarded to W. E. Logan & Sons, October 12, 1953, at a price of \$273,901.50. The Logan contract was completed on July 26, 1954, in 204 working days.

Grading equipment used included a standard fleet of heavy units. Soil was placed in 8-in. compacted layers and rolled with sheepfoot rollers and loaded earthmoving equipment. The top six inches of fills was consolidated with a pneumatic roller. Areas not accessible to rolling equipment were compacted with a Barco Tamper, pneumatic tampers and hand tamps.

Five major bridges in the job were awarded under separate contract. These are noted for their possible bearing on the contractors' organization of the paving work and effect, if any, on bid prices for the paving.

Specifications for the p.c. concrete pavement called for an 8-in. thick, 24-ft. wide uniform slab on a 4-in. by

28 ft. sand cushion. The 10-ft. wide outer shoulder, and the 3-ft. wide inner shoulder, are constructed of 8-in. thick soil-cement with a double bituminous wearing surface.

Material used in the sand cushion came from a pit near the road site. This material was a fine, sandy, non-plastic soil with 100 percent passing a No. 40 screen and 20 to 30 percent being minus 200 and largely silt.

Equipment used in compacting the sand cushion and in fine grading included a 10-ton pneumatic roller, a steel wheel roller, Pulvimixer, flat-wheel roller with Fordson tractor, and two motor graders.

Contract for the p.c. concrete was awarded to Dahlgren & Brooks of Oklahoma City on August 6, 1954, on their bid of \$444,602.31. This figure included \$26,074.52 of such non-paving items as 7,756 sq. yd. of Bermuda slab rod, metal guard rails, and various materials for underdrains. Seven bids on the concrete ranging from a high of \$456,549.

Concrete placing procedure followed Oklahoma state highway department specifications except for revisions suggested by the Portland Cement Association. These included use of air-entrained concrete; elimination of expansion joints except at structures and intersections; use of doweled contraction joints only adjacent to expansion joints or free ends; sawed transverse joints at 15-ft. intervals; use of white pigmented membrane curing compound; and use of cold applied joint sealer.

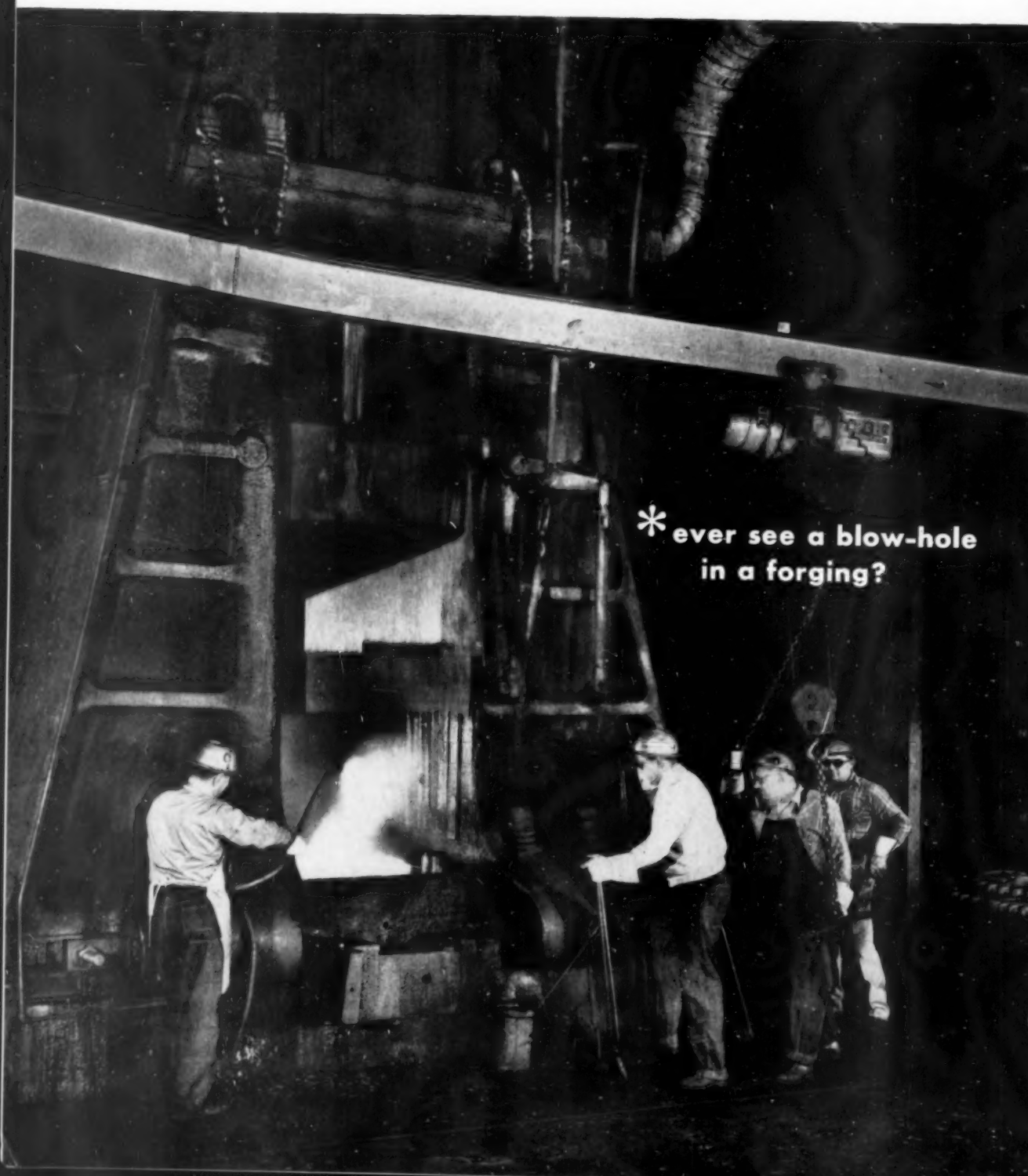
Actual placing of concrete began

(Continued on page 118)

don't spare the rod with

P&H

* ever see a blow-hole
in a forging?



power cranes & shovels?

*see why **P&H** gears have the guts to take it

You never need ask if P&H power cranes and shovels will handle rated capacity. They've got the guts to deliver at capacity day after day.

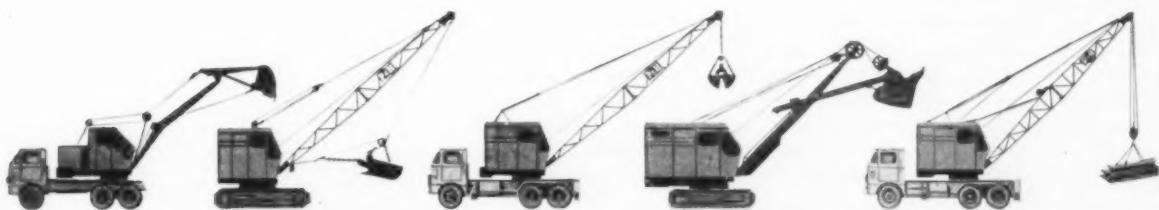
That's why we tossed out castings under critical stress. Replaced them with forged gears. Just like we tossed out castings for uppers and lowers. Replaced them with weldments.

Forged gears help us give you automotive performance in P&H equipment. Cut to a tolerance of 0.001 inch, they're splined to heavy shafts running in antifriction bearings. Line boring of all-welded construction assures perfect alignment. Gears and roller chains in the power box are sealed in an oil bath to minimize friction.

Operators quickly discover the smooth flow of power from motor to dipper or hook. They miss the grind and vibration of old fashioned shovels and cranes.

You'll quickly discover the difference in operating cost. Less down time. Low repair and replacement cost. Even with the toughest digging. That's why we proudly say—don't spare the rod with P&H power cranes and shovels. They've got the guts to take whatever comes their way... day after day after day.

No matter how small or how large the job, there's a P&H model to help you make money. Harnischfeger Corporation, Milwaukee 46, Wis.



For Modern Engineering, Look to

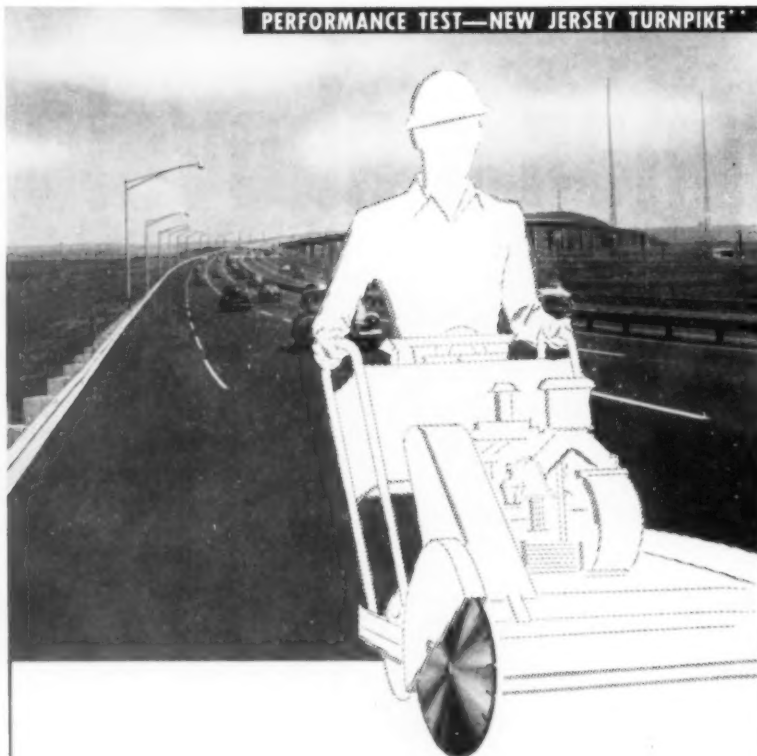
HARNISCHFEGER

Power Crane & Shovel Division

the **P&H** *Line*



... for more details circle 286, page 16



NEW CARBIDE BONDED* BLADES... ...TRIPLE ASPHALT FOOTAGE!

After years of research and development Consolidated Diamond Tool has been successful in blending diamonds in a carbide matrix. **DIAMONDS...** are the hardest, most durable of all materials. **CARBIDE...** is the toughest, most enduring of all metals. **RESULT...** the amazing Carbide Bonded, diamond asphalt and concrete cutting blade.

Careful analysis of field reports and tests, conclusively shows that the new Consolidated blade lasts 2 to 3 times longer than any other blade...every time. In asphalt the Carbide Bond blade more than triples normal footage. Longer blade life means lower costs...lower costs mean lower bids...lower bids mean more contracts, more profit.

At the start of the New Jersey Turnpike job, four sub-contractors were trying the blades of five leading manufacturers. At the end of the project all were using the new Consolidated blade exclusively. **Performance is Proof.**



Write today for full information and prices.

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DIAMOND TOOL CORP.
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*Patents Pending.

**Detailed N. J. Turnpike test available on request.

CONCRETE AND MASONRY CUTTING BLADE DIVISION

Asphalt or Concrete

(Continued from page 115)

early in October, 1954. A batching plant was set up by the contractor beside the Santa Fe railroad in Edmond, involving a 5-mile batch haul to the paver. Concrete equipment included one 34 E paver, one spreader, one transverse finishing machine and a power bull float.

Specifications called for a six-bag, 5½-gal. mix. Limestone aggregate was delivered by rail; fine aggregate was obtained from three sources. Type I cement was shipped by rail in bulk cars from plants of the Ideal Cement Co., at Ada, and Dewey Portland Cement Co., at Dewey, Okla.

Contraction joints were sawed to 1½-in. depth using Target's silicon carbide saw blades in a Clipper C-250 power saw.

Expansion joint filler was formed from ¾-in. redwood boards. Premolded tongue and groove material was used in longitudinal keyed joints. Smooth 1-in. round steel dowels 24-in. long were used in contraction, construction and expansion joints. These dowels were dipped in a thick bituminous roofing cement.

Asphalt Concrete Design

The asphaltic concrete design required a 6-in. thick subbase through some extents, a 7-in. thick stabilized aggregate base, a 3-in. binder course of Type "A" mix asphaltic concrete and a 2-in. wearing course of Type "B" mix asphaltic concrete. Asphaltic stabilized material 6-in. in depth with a single bituminous surface treatment was specified for the 10-ft. wide outside shoulder. Hot mix soil-asphalt 5-in. in depth and tapered to 2½-in. at the outside edge was specified for the 3-ft. wide inside shoulder.

Where evaluation of the roadbed soils after grading revealed areas lacking adequate stability, a 6-in. thick blanket of compacted granular material was placed in the subbase. This met the design requirements for a subbase having a California Bearing Ratio of 10 or more.

Specific subbase requirements were for a sandy and granular material, all passing a 2-in. sieve, and that part of the material passing a No. 10 sieve to have 15 or 40 percent minus 200 material. A liquid limit of 35 or less and a plasticity index of 10 or less was a requirement for that portion of material passing a No. 40 sieve.

Definite specifications for the 7-in. thick stabilized aggregate base course were for blended coarse aggregate, sand, stone, dust, "or other inert fine-

... for more details circle 201, page 16

ly divided mineral matter and soil binder, containing not less than 40 percent uniformly graded crushed material retained on the No. 4 sieve."

Specifications for the hot mix asphaltic concrete required that all aggregate in the Type "A" mixture should pass a 1½-in. sieve and have a slightly less asphaltic content than the "B" mixture (passing ¾-in. sieve).

Asphaltic Concrete Contract

Contract for the asphaltic concrete pavement was awarded August 6, 1954, to the Metropolitan Paving Co., Inc., of Oklahoma City at their bid price of \$353,007.58. This figure included non-pavement items totaling \$30,849.65. Sodding, guard rails, and underdrain construction and material were among the larger items.

Work on the asphalt contract was started early in October, 1954. The contractor set up a Barber-Greene asphalt plant on the job.

The first work was the laying of underdrain pipe, reshaping the roadway, removing unsuitable soil in certain areas and replacing it with suitable soil. Compaction was done with sheepfoot and rubber-tired rollers. Frequent density tests of the subgrade were made to insure compliance with the specified density of 95 percent.

The first blend of materials for the 7-in. stabilized aggregate base course, was 65 percent local pit sand and 35 percent crushed limestone. Gradation tests showed this blend to be unsatisfactory, so sand from a new pit was obtained. A ratio of 60 percent sand and 40 percent stone was found satisfactory and used for rest of job.

Placing a Type "A" asphalt followed closely behind the 7-in. base course construction, and as soon as the priming coat on the base course was sufficiently cured.

Both the asphalt and the portland cement concrete sections were opened to traffic before clean-up and shoulder work was completed. The projects were finished in December, 1955.

The following department engineering and technical personnel were directly concerned with the execution of the test road project: C. A. Stoldt, director; G. H. Bittle, chief engineer; Jno. J. Stobaugh, Jr., construction engineer; J. B. McCaleb, design engineer; G. E. McCamy, materials engineer; R. A. Helmer, research engineer; J. M. Copeland, resident engineer.

• Donald E. Crabbs has been appointed district sales representative for Link-Belt Speeder Corp., Cedar Rapids, Iowa. Crabbs will supervise the district served by Michigan Tractor & Machinery Co., Detroit and Grand Rapids, Michigan.



Seal joints with FLINTSEAL* ...and keep water from getting under your pavements!

Count on this popular rubber-asphalt compound to keep your concrete road joints free from costly water seepage. Year after year. Without re-pouring.

Flintseal stays extensible and compressible through all weather... through expansion and contraction of slabs. It won't crack in cold... won't flow in heat. Bonds firmly... to keep water and dirt out of joints.

Flintseal (hot-poured), Flintseal JFR (jet-fuel-resistant) and Flintkote Cold Poured Sealers meet state and federal specifications. Accept nothing less than these rubber bearing joint-sealing compounds for positive long-lasting sealing, and economical maintenance.

Ask for literature and application data for roads, streets and airfields.



You find Flintseal is *super* for super-highways. One application lasts for years and years.



Flintseal bonds to joint walls perfectly. Keeps pavement maintenance costs down.

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... for more details circle 288, page 16



No. 87 Torch—up to 30 hours of steady, weather-resistant burning. Ideal for excavations, road shoulders, rubbled areas.



"Little Wizard"—up to 30 hours of wind-defying light that burns bright, stays bright to the very last drop!



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Sound, highly visible safety lighting that's dependable in all weathers . . . *How much does it cost?*

Seldom more than 1/4th of one percent of your cost for the project!

Yet serious accidents due to inadequate safety lighting *can* cause an upward revision in insurance rates that makes good lighting seem cheaper than ever!

When you protect the public, you protect *your pocketbook*—or the one you're responsible for.

Dietz does it . . . for pennies per day!

Here is the most complete line of long-burning kerosene lanterns and torches on the market.

Here is *dependable* night-long protection for drivers . . . for pedestrians . . . and for *you!*

● Ask your safety lighting man to take a good look at the **DIETZ** line of safety lanterns and torches, at your distributor's or hardware dealer's. **R. E. DIETZ COMPANY, 102 Leavenworth Ave., Syracuse 1, New York.**

OVER A CENTURY OF SAFETY LIGHTING

. . . for more details circle 202, page 16

Better drafting methods discussed at institute

Of interest to highway and street agencies was the two-day Drafting Organization Institute held March 1-2 at Madison, Wisconsin, under the University of Wisconsin Extension Division. About 75 supervisors of industrial drafting departments attended, where they heard papers given on industry-tested short-cuts in drafting and improving supervisory methods.

With draftsmen in short supply and industry working at boom capacity, the drafting room has become a bottleneck, noted Prof. Robert A. Ratner of the Extension Division engineering department, who is institute coordinator. To overcome the handicap of detailed, time-consuming drawings, some firms began experimenting a few years ago with simplified drafting procedures. The movement, Ratner said, began at General Electric Co. and has been carried forward by other companies. American Machine and Foundry Co., for instance, found it could reduce drafting time by 40 per cent by eliminating much of the detail and hand lettering in its drawings.

Oklahoma has on-job training program

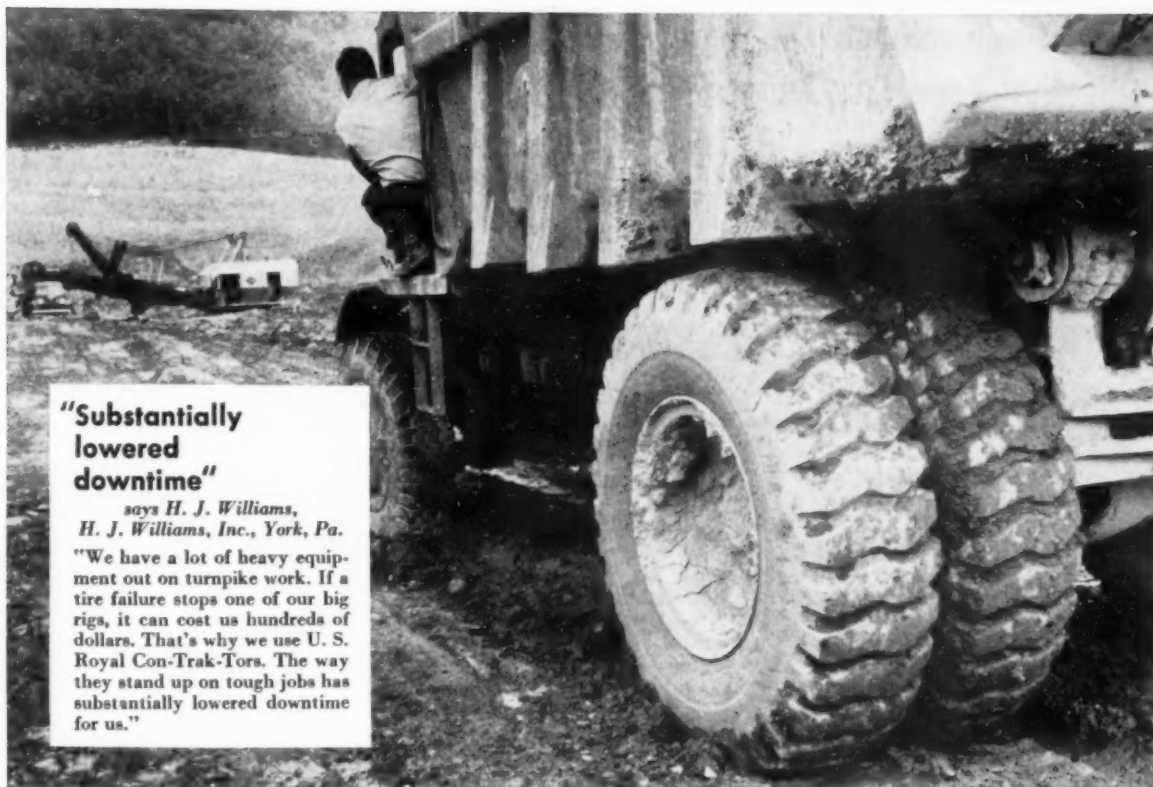
The Oklahoma state highway department has a cooperative training program with Oklahoma University and the State's A&M College. According to highway director C. A. Stoldt, 50 young men have applied for this on-the-job training program which will lead to a civil engineering degree and involve working with the highway department. Applicants come from within and without the present department staff.

Completion of the planned study course, taking six years, includes seven months of practical experience in the field with pay.

Jersey Turnpike landscape job

Following the widening program recently completed on the New Jersey Turnpike, the Turnpike Authority this Spring is initiating the first phase of an extended program of landscaping and beautification of its 118-mile highway. Bids have been asked from nurseries and other suppliers of plant material for about 15,000 trees and shrubs. A good part of the job will be concerned with the extensive acreage lying within service areas.

Costly Downtime Drops!



**"Substantially
lowered
downtime"**

says H. J. Williams,
H. J. Williams, Inc., York, Pa.

"We have a lot of heavy equipment out on turnpike work. If a tire failure stops one of our big rigs, it can cost us hundreds of dollars. That's why we use U. S. Royal Con-Trak-Tor. The way they stand up on tough jobs has substantially lowered downtime for us."

Approach to south portal of T. J. Evans Tunnel, on the Pennsylvania Turnpike near Allentown.

U. S. ROYAL

NYLON
CON-TRAK-TOR
FULL LUG

If, like Mr. Williams, you use heavy-duty trucks, you can reduce your equipment downtime and your operating cost with the U. S. Royal Con-Trak-Tor. Here is why.

This tire's *Nylon cord carcass* stands up to vicious shocks, fights off sharp rocks and snags. It has *triple impact protection*—extra cushioning rubber between plies, double shockpads under the tread, extra-tough construction at the crown.

Its *full-lug traction* pulls right through toughest going, reduces sideslip to an absolute minimum, just won't bog down.

Your U. S. Royal Dealer now has the U. S. Royal Con-Trak-Tor in your size. Have him put it on your wheels—and prove to yourself why men like H. J. Williams report that both downtime rates and operating costs *drop* with this great tire!



United States Rubber

... for more details circle 277, page 16

ROADS AND STREETS, April, 1956

ROADS WORTH THEIR SALT...

Stā-Bilt Salt Stabilization Method Brings All-Weather Road Cost Below \$400.00 a Mile

All-Weather gravel roads, vital to farm, school and suburban traffic-feeding, are being built today at a cost often less than \$400.00 per mile according to recent surveys among county highway officials. And the fact that these roads often serve through many years with minimum maintenance, speaks well for modern methods of road stabilization.

The principal means of achieving such roads is with the use of Salt, carefully and thoroughly blended and mixed with well-graded road gravel, crushed aggregate or native soils by means of a Seaman-Andwall Pulvi-Mixer. Properly constructed, such a road will last for years under heavy traffic, requiring only an occasional application of calcium chloride solution or light oil. When it is considered that former gravel roads often required eight or nine bladings a year to keep them in shape, the difference in maintenance cost is substantial.

The Seaman-Andwall "Stā-Bilt" method of salt stabilization has many advantages. It mixes the salt to complete depth of the road base, lowering the temperature at which injurious frost action will occur. The salts form a solution which so lubricates the mass as to improve its workability, resulting in better density and water-tightness, with a durable, resistant, glazed surface finish after compacting. All coarse aggregates are securely anchored against raveling, potholing, and dusting.

As its relatively low cost indicates, the Stā-Bilt salt stabilization method is comparatively simple. Stabilizing the subgrade is as important as stabilizing the surface. This should be scarified, if necessary, then brought to proper crown and grade. Then after moistening, the Seaman Pulvi-Mixer pulverizes, mixes and blends the subgrade soil to a depth of 4 to 6 inches or more. This mixing can usually be done for less than one cent a square yard, and is performed with much greater speed and uniformity than the old-fashioned method of multiple passes with a blade. For greater stability this can then be moistened and salt ap-

plied with a Century Spreader (1 or 2 pounds per square yard). This is again mixed in full depth, with the Pulvi-Mixer, and compacted with a heavy pneumatic roller.

After again moistening the subgrade, the wearing surface can be spread uniformly, shaped and graded. Then the same procedure followed as with the subgrade — spreading salt (1 to 1½ pounds per square yard) watering generously, then mixing all materials with the Seaman Pulvi-Mixer. Diagram A shows recommended routing of the mixing operation to avoid further reshaping. Usually one mixing will be sufficient if soil is well moistened.

The Seaman Pneumatic Roller is used immediately after mixing. As the surface becomes firm, enough water should be added to leave a free film on top, then rolling should be continued until water disappears, leaving a glossy surface



The final result will be a tough, durable, all-weather gravel road withstanding years of hard traffic with surprisingly little maintenance.

Two methods are currently used to add further life to Salt Stabilized roads. The first is to apply a water solution of calcium chloride two or three times yearly. The second, is application of road oil (SC-3) to the dried surface — about 1/5 gallon per square yard, repeating the application after two weeks.

As time and budget permit, many counties are adding bituminous surfaces to salt stabilized roads for greater permanence.



Spreading salt on Illinois county highway with Seaman-Andwall Century Spreader. Note uniformity of spread.



Final mixing of salt in wearing surface with Seaman Pulvi-Mixer, prior to final compaction. Notice uniformity of mix.



Finished road, Kendall Township, Illinois. Soil-stabilized for many years of traffic with minimum maintenance.





Complete Stā-Bilt Equipment for Salt Stabilization



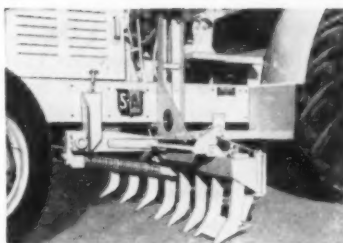
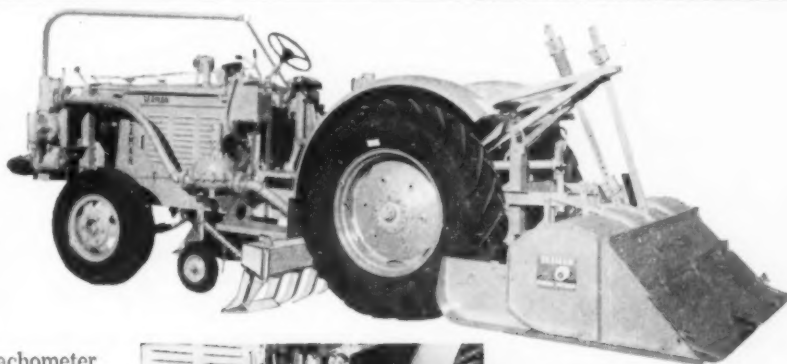
CENTURY "Posi-Feed" SPREADER

Today's leading tailgate spreader, the CENTURY "Posi-Feed" Model HY-4 is equipped with vibratory mechanism in the truck body to maintain steady movement of materials into the spreader. Spreader tray can be replaced with spinner unit for winter use in spreading sand, cinders or salt. One man operation from truck cab — requires no hand feeding.

SEAMAN TRAV-L-PLANT

Today's stabilization "workhorse" the Seaman Trav-L-Plant does a thorough and uniform job of mixing in either new construction or reconstruction. Provides an accurate blend of coarse and fine aggregate for greater load-bearing strength in all types of roads.

Equipped with pump, spray bar, tachometer assemblies, and volumetric meter for applying water or bitumen simultaneously with in-place mixing operation. Gasoline or Diesel powered. 7-foot mixing width. Can be equipped with S-A Underbody Scarifier for light scarification.



NEW UNDERBODY SCARIFIER

Can be mounted between front and rear wheels of the Seaman PULVI-MIXER or TRAV-L-PLANT, for light scarification, frequently in the same operation with mixing and binder application. Easily attached, inexpensive.



PNEUMATIC COMPACTOR Portable, Self-Propelled

Self-Propelled for transport road speeds up to 20 m.p.h. the S-A heavy duty, rubber-tired Compactor is of revolutionary new design. Provides new "straight down" pressure that avoids pushing action, surface shear, scuffing, material displacement. Power Steering — full 180° turn on 20-foot road beds. Four 500-gal. liquid ballast compartments for weight adjustment from 5 to 20 tons. Complete with electric brakes and lights for night transport.

... for more details circle 254, page 16

ROADS AND STREETS, April, 1956

Other Stā-Bilt Equipment Includes:

- Self-Propelled Pulvi-Mixer
- 2-3 Ton Portable Steel Wheel Roller
- HERCULES Cement Spreader
- CENTURY Material Spreaders

Write for FREE Bulletin on Salt Stabilization. Describes advantages, latest techniques and equipment required for building long-lasting, weather-resistant roads at low cost with salt binder.



STABILIZING THE WORLD

SEAMAN-ANDWALL
CORPORATION

230 NORTH 25th STREET • MILWAUKEE, WISCONSIN

Mobile Batching Plant Helped Bid California Job



- Shown here is a Noble-Mobile batching plant-on-wheels, as set up by H. W. Gentry Company, of Walnut Creek, California, for a project 21 miles from this firm's stationary ready-mix concrete plant. The equipment, which batches automatically, was moved over the highway to the job site, and put quickly into production with no field wiring, footings or need for an erecting crane.

Special cattle loading ramps for Kansas Turnpike

An innovation in customer service is revealed by the Kansas Turnpike Authority, which plans special cattle loading and holding facilities at two

points along the Turnpike. At one location in Butler County, loading pens and special interchange facilities will be available only for trucking cattle onto and off the Turnpike. At a point in Chase County, another loading pen and special Turnpike over-

pass will be located, accessible by truck only from the Turnpike.

These facilities, part of the bid for trucking business, will permit cattle to be moved from the "bluestem" pasture area toward the Kansas City and other markets.

Many ways to compute fees

There is little uniformity among states on the matter of consultants' fees as reported on state highway and turnpike work. In 15 states surveyed, fees for final design and preparation of plans and specifications for bridges and roadways ranged from 2% to 5% of the cost of construction. The fee depends upon size of the job, its complexity, and the amount of data made available by the contracting agency.

Usually, the fee is a percentage of construction cost, but four other methods are also commonly used:

- Lump-sum fee based on percentage of estimated construction cost or on an estimate of engineering costs plus allowance for profit and overhead.
- Other basis: Cost of engineering salaries plus a fee; fee based on number of days' work involved; fee per mile of roadway.

When You Specify Southern Tire Retreading

**NO TIME
LOST!
BIG MONEY
SAVED!**



NO TIME LOST . . .

Because Southern Tire representatives pick up and return your tires at your job site after work hours, assuring no costly equipment downtime.

BIG MONEY SAVED . . .

Because Southern Tire Retreads are guaranteed to equal new-tire mileage—at half the cost! Southern Tire's giant three-sectional molds (standard with U. S. Army) are fitted to the tire, instead of tire being cut down to fit mold. Finished retread has as much rubber in the lugs as a new tire and more undertread than any rock service tire.

CHOICE OF ROCK SERVICE, TRACTOR TYPES, OR RIB TREADS TO SUIT YOUR PARTICULAR JOB.



All Sizes from 1100x24 to 2700x33.
Also new sizes 29.5x25 and 29.5x29.
Call Your Favorite Dealer and Specify Southern Tire Retreads.



**SOUTHERN
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312 - 316 S. COURT STREET
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L-O-N-G Reach, plus LIFT Ability!

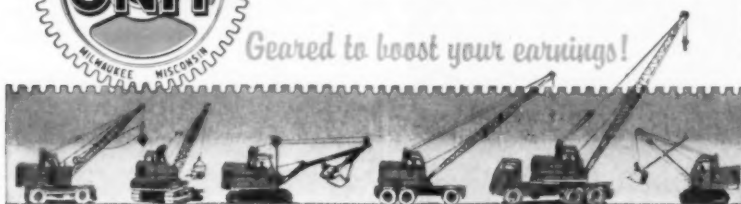
The UNIT Challenger comes in handy for *any* construction job, large or small. On the poured basement job shown above, for example, the Challenger has plenty of reach and lift ability for handling the heavy concrete forms. And it does the work quickly, efficiently and at low cost. Challenger features include: One-piece cast main machinery case . . . Modern transmission design . . . Alloy steels and forgings . . . Involute splines . . . Force feed lubrication . . . Straight-in-line engine mounting . . . Hydraulic actuated clutches . . . Full floating, trunnion-mounted taper drums . . . Torque Converter . . . Safety-promoting, full vision cab . . . Full convertibility to all attachments. Compare the Challenger, part for part, with any machine of its size and type. Then you will realize why it leads the field in design and performance. Bulletin C-800 gives all the facts.

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Milwaukee 14, Wisconsin

Please send me your new Bulletin on
the UNIT CHALLENGER Model 510.

Name.....

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State.....

... for more details circle 267, page 16

ROADS AND STREETS, April, 1956

Better, Quicker Turf with NOZZLE-FED PELLETED FERTILIZER

By Peter C. Crolius

Nitrogen Division, Allied Chemical & Dye Corporation

Sand blasting equipment has been adapted to job of applying fertilizer in roadside landscaping, with advantages in cost, time saving and results. Herewith are some of the details from recent experiences.

A FAST, SIMPLE, low-cost method of applying fertilizer to roadsides is proving itself in at least three eastern states. It's called air blasting, meaning that fertilizer is distributed under air pressure to roadside turf. All it takes is a few feet of rubber hose, an air compressor, and a rather simple feeding system and truck-mounted applicator. While still in its infancy, air stream distribution of fertilizers is proving its worth in saving time and labor — thus, in cost reduction.

Production of granular (pelleted) fertilizer compounds has made air blasting practical. As the name implies, granular fertilizer is manufactured as hard grains about the size of small pebbles or large grains of

sand. Designed for free-flowing, non-caking, dustless properties, pellets resist breakage during application but disintegrate readily when exposed to soil moisture. Granular fertilizer can also be applied by conventional distributors, of course.

Fertilized Vegetation

Vegetation treated with fertilizer develops healthier, longer roots and tops. It's in better condition to check destructive soils erosion, make a better appearance, and provide firm underfooting to vehicles parked or working along roadsides.

Edward M. Davis, Maryland State Conservationist of the U. S. Soil Conservation Service and pioneer in air

blasting fertilizer, says that "fertilization of roadside vegetation is a protection, a form of insurance, on the tremendous investment of highway construction. There's no question about it — grass won't continue to grow indefinitely on roadsides without help. Satisfactory fertility levels in soils are a 'must.' We've been looking for a long time to find an economical means of fertilizer application, and I think we've found one in air blasting."

Davis, working cooperatively with S. W. Baumiller, Landscape Engineer of the Maryland State Roads Commission, started in 1937 a program called the Vegetative Control Project. It was directed toward studying efficient means to keep highway areas in top condition. The thick mat of sod which shows up today on many of Maryland's rights of way bears evidence of the success of their research. Part of the program's success has been due to the development of air blast applicators.

After experimenting with a number of methods and applicators, Baumiller and Davis found that by uniting three elements — air stream, fertilizer supply, and mixer-dispenser — granular fertilizers could be readily supplied to roadsides. In initial experiments they employed sand blasting equipment. Adjusting feed flows, jet-nozzle clearances, and pressures, they were able to maintain a constant distribution of granules through the system. Later they found they could cut application time in half by using high-analysis material (containing over 30 per cent total plant food). On certain Maryland soils, containing better than 20 per cent silt-plus-clay, one dose of high-analysis fertilizer was enough to give a two-year boost to roadside grass.

Looking for a machine more suitable for fertilizer application, Bau-

(Continued on page 130)

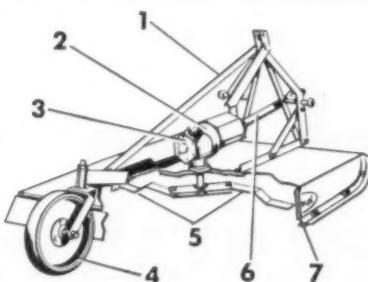
- Pangborn compressed air applying units being tested by highway maintenance personnel; used in tandem, one nozzle aimed high, the other low. (Photo courtesy Maryland State Roads Commission).



Works up to 300% faster and at less cost!



**BUILT TO STAND THE SHOCK
OF STONES, CANS, BOTTLES**



1. Heavy angle frame
2. Friction-type clutch instead of shear pins
3. Forged steel gears run in oil
4. Fully rotating gauge wheel with puncture-proof tire controls cutting height
5. Heat-treated blades swing back when an obstruction is hit
6. Heavy-duty Universal Drive
7. Low cost replaceable runner shoes



... for more details circle 281, page 16

ROADS AND STREETS, April, 1956

FORD Rotary Cutter

Where heavy weeds and small brush would mean slow, difficult and often impossible mowing with an ordinary mower, the Ford Rotary Cutter attached to a Ford Tractor does a fast, clean job.

*It saves time . . . works up to 300% faster than conventional mowers. Mows a full 5-foot swath . . . adjusts to a positive cutting height from 2 to 10 inches. And, since it attaches to Ford Tractor's 3-point hitch, it mows *behind* the tractor.*

It saves money . . . costs less to buy, less to operate and maintain. No belts to replace . . . no sickle bars to buy.

Find out for yourself how you can maintain more miles of roadside per day, and at less cost, with a Ford Tractor and Rotary Cutter. See your nearby Ford Tractor and Equipment Dealer or write to the address below for free literature.

**TRACTOR AND IMPLEMENT DIVISION
FORD MOTOR COMPANY
Birmingham, Michigan**

NEW model **HO**

2¼ cu. yd. capacity
7,500 lbs. @ 4 m.p.h.



Bigger Capacity...

This new, 1956 model HO "PAYLOADER" has a bucket capacity of 2¼ cu. yd. payload, 1¾ cu. yd. struck . . . is the biggest-capacity "PAYLOADER" ever offered, and outstanding by any measure. Pound for pound, it's ahead of the field in digging power and carrying capacity. It's more maneuverable, faster operating, easier op-

erating, easier riding—with or without a load—than anything near its size. It delivers better, more reliable traction over a wider range of ground conditions than any wheeled tractor-shovel ever has. It has balanced design and durability *throughout* to deliver big yardage day after day without interruption.

HOUGH Design . . Quality . . Value

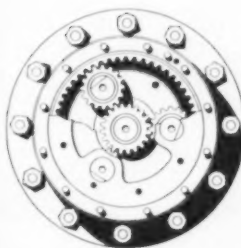
Digging power: Pound for pound, this "PAYLOADER" has more traction and digging power—for a wider range of ground conditions—than any wheeled tractor-shovel ever built.

Hydraulic shock absorber: A shock absorber in the hydraulic system smooths out the ride, permits faster load-carrying speeds over rough terrain—with less spillage.

More production, less effort: Power-steer, power brakes (on all 4 wheels), power shift (no "clutching") and good riding qualities also lessen operator fatigue—promote full production all day.

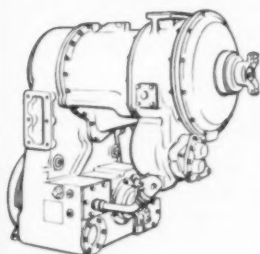
"Stay-clean" hydraulic system: The hydraulic system is closed and pressure-controlled to keep air and dirt from being sucked into the system. This reduces oil foaming, lessens trouble and increases the life of pump, valves, cylinders, rod packings. Both boom and bucket rams are located so as to minimize their exposure to dirt and damage.

Accessible: Unusual accessibility for servicing and maintenance is built into this "PAYLOADER." Battery and oil reservoir are located under an easy-access cover just behind driver's seat. Easy access to engine is possible from either side—and not hindered by boom arms or other structure. "Pick-off" outlet is provided for the easy addition of hydraulically-operated accessories.



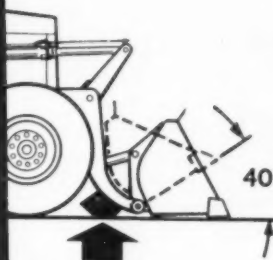
Long-life, high-traction drive train

Heavy duty planetary final drives in the wheel hubs, and hypoid differential gearing, keep torque low in axles . . . prolong life of axles and all drive train parts. More effective traction is assured by the use of the model HO torque-proportioning differentials. If one wheel starts to slip, more power is delivered to the opposite wheel. The wheel with the better traction automatically gets up to 24% more torque.



Complete power-shift transmission

The easiest-acting, most effective transmission ever built into a tractor-shovel. All Shifts up or down can be made instantly, on-the-go under full engine speed. There's no foot clutch, no stopping for a RANGE shift. The forward-reverse control can also be operated under full engine speed, in any gear, while retaining full bucket action . . . all this, plus torque-converter drive.



Tremendous pry-out action and 40° tip-back at ground level

Special pads are provided on the bottom of the boom arms to give ground support for powerful pry-out action. Load forces are also absorbed by the pads, relieving the axles and wheels of these strains. The bucket can tip back 40 degrees, before raising, to get heaped loads quick and easy even in shallow cuts and low piles, and to retain heaped loads.

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If you want the last word in tractor-shovel workability on your jobs, you'll want this husky HO "PAYLOADER". Your Hough Distributor is ready to give you full information.



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SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



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Send full information on "PAYLOADER" 4-wheel-drive tractor-shovels

☐ model HQ—2¼ cu. yd. ☐ model HH—1½ cu. yd. ☐ model HU—1 cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____ State _____

... for more details circle 221, page 16



- New Jersey Turnpike crew air-blasts granular fertilizer to an embankment near the Swedesboro Interchange. Soils in this area are very sandy, requiring heavy doses of maintenance fertilizer.

Pelleted Fertilizer

(Continued from page 126)

miller and Davis took their ideas to the manufacturer of Pangborn sand blasting equipment. An existing low-cost unit originally designed for cleaning granite, stucco, and marble was found to be suited to blowing granular plant foods.

Maryland currently has ten Pangborn units (a unit is a supply hopper, applicator, and connecting hoses). For most efficient operation, two units in tandem are frequently used. One applicator fires high and far, the other low and close. Three men are needed for two units: two operators and a man to fill the hopper. A truck driver is also necessary, of course.

Mr. Baumiller says that accord-

ing to recent experiments using 12-12-12 fertilizer, he has cut costs considerably not only in material and labor but operation time as well. High-analysis material, he says, is more economical per plant food unit, and requires less storage space. Baumiller said, "We calculate that by using 12-12-12 for maintenance, our two-unit system can cover 60 roadside acres in an eight hour day. However, the equipment operates faster than our crews can handle it, so we figure on about 50 acres a day. Cost of labor and equipment per day per acre is \$1.27 — for 50 acres, \$63.25."

Maryland's work and successes with air blasting induced New York to consider the process. In 1952 tests

for distance, volume, and coverage were run by Landscape Bureau personnel using a Pangborn air blast device.

Directed by Nelson M. Wells, Landscape Bureau Director, experimental work with the air blaster was incorporated with vegetative studies already underway in New York. These studies were launched in 1951 as a means of "exploring the possibilities of reducing (roadside vegetative cover) costs."

Manufactured Units

New York has recently bought a dozen manufactured units and will probably use them in much the same way as Maryland has—that is, with the applicator and fertilizer supply in the truck bed, the truck towing the compressor. While Maryland uses a gravity supply hopper, New York state crews have found that the intake pipe can be placed directly in the fertilizer bag.

(As additional developments are made in air blasting, it is probable that fertilizer will be bought in bulk rather than in bags. One drawback to bulk purchases has been the handling problem: it is much easier to handle and store bags than loose material. If bulk fertilizer does become operational, however, we can expect to find differences in feeding mechanisms of the distribution units.)

Interested by a preliminary report issued by New York State, Homo Hagemeister, Chief Horticulturist, en-

(Continued on page 134)

- "Homemade" New Jersey Turnpike applying gun. Compressed air enters from the left, fertilizer from below. A standard plumber's reducing tee ($1\frac{1}{4} \times 1\frac{1}{4} \times 1$), enclosing the machined jet, forms the mixing chamber.



- The Pangborn applying gun was designed for shooting abrasives, but can double as a fertilizer applicator. Fertilizer is fed from below, air from the left. At least one other company is producing a gun specifically for granular fertilizer application. (Photo courtesy N. Y. Dept. of Public Works).



NEW GALION

T-500 and T-600

GRADE-O-MATIC[®]

MOTOR GRADERS

**Utilizing a Torque Converter and Power-Shift Transmission*



Model T-500
125 H.P. 25,000 Lbs.
(Weight with Scarifier)



Model T-600
140 H.P. 30,785 Lbs.
(Weight with Scarifier)

NEW

STANDARDS OF WORK PRODUCTION !

Engineered balance of weight and power produces the utmost in "PUSH-POWER" at the blade — where power means most in moving more material in quicker cycles. Torque Converter drive provides up to 300% torque multiplication for tough going, absorbs shock loads and prevents engine lugging and stalling.

NEW

EASE OF OPERATION!

No tiresome old-type gear shift or foot clutch to operate. All you do is move the fingertip hydraulic control levers. Either forward or reverse shift can be made "on the go"— while moving in either direction. Operator fatigue is greatly reduced.

TORQUE CONVERTER AND POWER-SHIFT TRANSMISSION.

Because of the AUTOMATIC features on Galion GRADE-O-MATIC Graders the human element is reduced to a minimum in achieving top grader performance.

These include AUTOMATIC power multiplication and application as needed, and AUTOMATIC adjustment of engine speed to the load at any predetermined working or travel speed.



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Please send me literature on the GRADE-O-MATIC Graders checked:

☐ Model T-500 ☐ Model T-700 — 190 H.P., 40,125 Lbs. The world's
☐ Model T-600 biggest, heaviest, most productive Motor Grader

OTHER GALION MOTOR GRADERS: Models 118, 104, 450, 303 & 503

PERSON _____ TITLE _____

FIRM _____

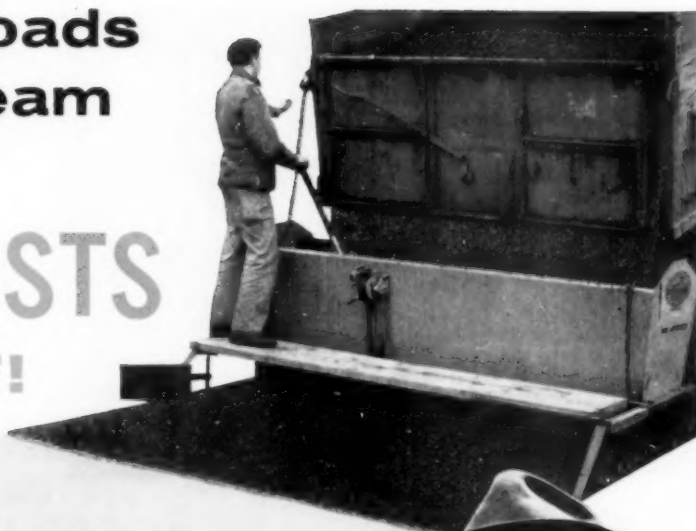
STREET _____

CITY _____ STATE _____

... for more details circle 208, page 16

ROADS AND STREETS, April, 1956

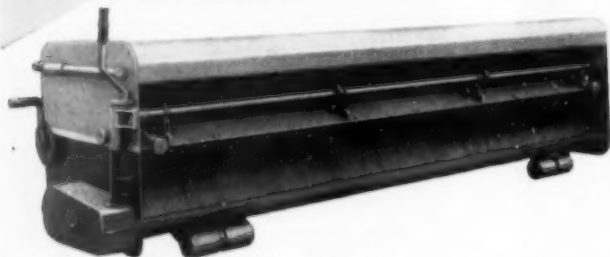
This Good Roads Spreader Team ...CUTS PAVING COSTS IN HALF!



The "Odell" Aggregate and Asphalt Spreader—designed with the contractor in mind, features low initial cost and exceptionally fast operation. Greater capacity—faster spreading, with less man-power, results in savings of over 50% in spreading costs.

The many "Odell" features, including positive one-time spread-depth adjustment and smooth, clean spread pattern, eliminates the need for 5 and 6 man crews . . . results in lower operating costs.

The Good Roads Handy Aggregate Spreader—spreads from powder-fine carpet up to 3-inch depth. It completely eliminates the danger of streaks and spotty spread . . . automatic transmission permits forward and reverse operation without shifting or de-clutching. Micrometer spread depth control eliminates constant re-setting. Once set, it remains constant for the entire job.



For complete details and specifications on the Good Roads spreader team and how it can help cut your paving costs, see your nearest Good Roads distributor, or write to:



GOOD ROADS MACHINERY CORPORATION

MINERVA, OHIO



GULF PRODUCTS *and* **FINE SERVICE**

keep equipment rolling
on Massachusetts Toll Highway Project

Berlanti Construction Co. Inc., Harrison, N. Y., has the contract for a 3-mile section of the new Massachusetts Toll Highway in the towns of Palmer and Brimfield, Mass. The photo shows a location where some of the 1½ million yards of fill will be required.



LIKE other leading contractors, Berlanti Construction Co. Inc., is mighty careful about controllable costs, particularly maintenance expense.

And that's an important reason why the Berlanti people select Gulf as their supplier of petroleum products on every job. They have found that Gulf quality lubricants keep their maintenance costs at rock bottom levels . . . and they appreciate Gulf's prompt delivery service and helpful petroleum engineering counsel.

Send the coupon for your copy of our new brochure, "Gulf and Your Business."

. . . for more details circle 215, page 16

ROADS AND STREETS, April, 1956



Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa. RS

Gentlemen:

Please send me a copy of your new brochure, "Gulf and Your Business."

Name.....

Company.....

Title.....

Address.....



● Close-up view of granular-type fertilizer used on sides of New Jersey Turnpike. Non-caking and free flowing, fertilizer of this type proved excellent for compressed air application.

Pelleted Fertilizer

(Continued from page 130)

gineers with the New Jersey Turnpike Authority studied possibilities of using air-blown plant foods on that 118-mile route. Directed by Hagemeister, Turnpike shops turned out a simple but very effective applicator

and intake system. Built around a standard plumbers reducing tee, materials and labor for distributor and intake cost about 20 dollars. Accessory equipment brought total costs up to 50 dollars.

Using the Maryland set-up, Turnpike crews applied maintenance doses of 12-12-12 pelleted fertilizer to south-

ern reaches of the busy dual. Applications made in October showed up significantly in January in the form of deeper-rooted, lusher "working" grasses.

Best results from fertilizing will be obtained when applications are made in the fall or spring prior to the growing season. Foliage may burn with summer doses, and leaching may occur before the grass benefits from a winter application. When turf shows signs of thinning out, yellowing, and losing its soil-anchoring ability, a need for fertilizer is usually indicated.

"Homemade" Equipment

With their "homemade" equipment, New Jersey Turnpike testers have experimented with a variety of pelleted fertilizers. Trials with urea and urea-form materials (45 and 38 per cent nitrogen contents respectively) showed that both could well be used. Hagemeister says he may use either or both high nitrogen materials for "booster shots" once the fertility ground-work has been established with a balanced plant food diet. Poor growth will result when phosphorous and potash are omitted from fertilizers

(Continued on page 136)



Arrow MOBILE HYDRAULIC HAMMERS ARE VERSATILE

Use ARROW MOBILE HYDRAULIC HAMMERS to drive shoring—posts—piling. Use them to break all types of paving—to cut asphalt—to compact trench backfills. You'll save money and do a better job in less time. ARROW MOBILE HYDRAULIC HAMMERS can be fitted with a wide variety of tools for special jobs. Exclusive creeper drive, with foot-controlled start and stop, is just one of the many money-making extras ARROW gives you. Get ALL the facts—learn why you get more for your money in ARROW MOBILE HYDRAULIC HAMMERS.

Write, Wire or Phone for complete information.
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RUEMELIN BLAST GENERATORS

FOR CLEANING BRIDGES —
WATER TOWERS —
STRUCTURAL STEEL



Many contractors use Ruemelin Blast Generators for cleaning steel work to remove rust, paint and scale before repainting. These machines are also used to remove laitance from cement wherever concrete construction is in progress. A wet adapting nozzle can be furnished to convert dry machines to wet type of operation. Built in several sizes.

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Bulletin 36-C

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Manufacturers
and Engineers
SAND BLAST AND
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EQUIPMENT,
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A 5742-1/4 R



Cleveland "Baby Digger" averages 3,500' of 22" x 36" water line trench daily, digging in clay and rock

R. L. Eatherly of Carthage, Tenn. got good daily trench production with his Model 95 Cleveland "Baby Digger" on this water line contract in the Belshire Subdivision in Nashville. Averaging 3,500 feet per day, the Cleveland cut 4 miles of trench, 22 inches wide by 36 inches deep in curving roadways on a subsoil composed of clay with fairly heavy rock content. The Cleveland's completely unobstructed operator visibility and the convenient grouping and location of its controls for easy accurate digging were definite advantages in cutting the curved trench. Just another example of the outstanding ability of Cleveland Trenchers to *dig more trench . . . in more places . . . at less cost.*

Talk it over with your Cleveland distributor



THE CLEVELAND TRENCHER COMPANY • 20100 St. Clair Ave. Cleveland 17, Ohio



CLEVELAND

... for more details circle 198, page 16
ROADS AND STREETS, April, 1956

Problem: how to map bedrock under New York's swift busy East River

Consolidated Edison Co. of New York wanted to lay cable under New York's East River, in a permanent trench safe from all possible disturbance. Question: would bedrock be encountered and if so, what was its profile? The East River is a swift narrow tide-rip carrying some of the world's heaviest marine traffic. Yet a Gahagan Seismic Survey Crew obtained an answer in just eight working days. For the design engineer, Gahagan seismic surveys save time and money, provide a wealth of information about the subsurface (on land or under water) in construction of highways, bridges, dams, power plants, etc. Write for Bulletin 3, Geophysical Survey Division, Gahagan Dredging Corporation, 90 Broad St., New York 4, N.Y.

Established in 1898, Gahagan is
a leader in hydraulic dredging

ANOTHER
GAHAGAN
CASE HISTORY

... for more details circle 207, page 16

GILSON USERS SAY: "YOU GET GILSON" FOR SIZE CONTROL

With the GILSON Mechanical Testing Screen you can size-test every shipment of highway aggregate—quickly and accurately—right on the job.

A questionnaire to GILSON users, many of them owners of several screen units, showed that 97.5% not only approve GILSON testing, but highly recommend it to others.*

The GILSON Screen pays for itself many times over. It does the job fast—five minutes or less per complete test; handles up to one cubic foot of sample—crushed stone, gravel, slag, coal, ores.

A sand attachment for handling 8-inch sieves is optional equipment.

Here's why you want GILSON:

1. Makes tests quickly and accurately
2. Two to seven separations simultaneously
3. Screen trays independently removable
4. Trays balanced to same tare weight
5. Visible separation to refusal
6. Few moving parts
7. Sturdy construction
8. Size range 4" to 200-mesh

Write for information and prices

*The remaining 2 1/2% includes 1% who found GILSON performance satisfactory but reserved recommendation, and 1% with no comment.

GILSON SCREEN CO. MALINTA, OHIO

... for more details circle 212, page 16



Pelleted Fertilizer

(Continued from page 134)

applied to soils already deficient in these elements.

In New York State, balanced fertilizers — those containing all three primary elements, nitrogen, phosphorous, and potash — are applied most frequently when grass areas are being established. Once established, turf is treated with high nitrogen boosters only.

"In performance trials with two machines," says a New York report, "100 lb. of fertilizer were distributed in two minutes by using a three-quarter inch nozzle and a 5/32-in. pointed air jet. Sixty feet was the effective distance of distribution up a one on two slope. The effective spread was 30 ft." The report goes on to say that better distribution was obtained with the air blaster than with a hydraulic applicator.

Depending on several factors, operational air volumes generally vary between 75 and 110 cfm. with satisfactory results obtained at around 90 cfm.

Hydraulic Application

While hydraulic application is not a new idea, it has increased in popularity in the last 6 or 8 years. The method recently attained considerable publicity in grass establishment operations on the West Virginia Turnpike. There 12-12-12, exceptional in its ability not to settle out, was mixed in water and pumped under pressure through a nozzle to the roadside. Including seed in the fertilizer-water mixture allows two operations to be carried on simultaneously. However, hydraulic applications like this call for a water source, water hauling, preliminary mixing, and frequent refilling. Air distribution gets away from these cost-hiking steps.

There's no doubt that a significant step forward in roadside maintenance operations has been taken with the development of air blast application. Granted, additional work needs to be done on the process, but already it is proving itself with facts and figures. As techniques are refined, it's conceivable that a variety of maintenance and construction jobs may be done by this method.

Airfield, railroad, public park, and agricultural representatives already are showing interest in air blasting. And considerations are being given to applying dry herbicides in air streams. Seed broadcasting tests already show promise.



● Clearing a slide on Oregon Route 30 east of Reedsport, following the recent once-in-a-century floods. Over 120,000 cu. yd. of removal involved.

When Nature Trips the Bucket

How the Highway Department Serves When Floods Strike

By W. W. Stiffler

Assistant State Highway Engineer, Oregon State Highway Department, Salem

Contractors to get bulk of \$2,750,000 expenditures programmed to restore roads and bridges following the pre-Christmas floods.

BEGINNING September 1, and through the rest of 1955, Oregon experienced rainfall considerably in excess of normal. During the four-day period, December 18 to 21, rainfall was intensified; in that time 11.2 inches fell at Port Orford; 9.18 at Reedsport; 4.78 at Roseburg; and 5.03 at Grants Pass. Mild temperatures prevailed; therefore, rain fell on snow accumulated in the Cascade Range.

As a result, on December 22 we experienced the highest river stages ever attained in southwestern Oregon. In fact, Rogue River reached a stage 2.4 ft. above the 1927 all-time high flood. At 10 p.m., December 21, Rogue River with a gauge reading of 13 ft. was reaching a flood stage in the lower areas between Medford and Grants Pass. Even so, the river rose 17 ft. during the next 10 hours.

On December 22 and 23, the streams dropped sufficiently for us to appraise some of the damage and restore traffic on some routes.

Then, in the 48-hour period, December 24 to 26, over 6.5 inches more rain fell at Port Orford; 4.6 at Roseburg; 4.42 at Reedsport; and 2.12 at

Grants Pass. The result, of course, was sections of highways washed out, landslides onto the roadbed carrying brush and trees, and severe erosion of the highway shoulders where not entirely washed out. A 60-ft. timber bridge near Grants Pass was entirely carried away and 80 ft. of the bridge crossing Applegate River on U.S. 199 was destroyed.

There were hundreds of smaller slides and fill slip-outs throughout the entire highway system.

● *Surveying the Damage.* It was late January before we were able to arrive at a realistic estimate of cost to repair the damage, which was submitted to our Highway Commission on January 26. That report appraises

the damage at \$685,400, all of which we feel is eligible for emergency federal aid under Public Law No. 413. However, since a portion consisted of small damage claims scattered over 124 locations, we do not propose to make any claim for emergency federal aid for damages totaling \$88,200.

With Commission approval, we began, at year's end, the programming projects in three categories for emergency federal aid under Public Law No. 413.

Part I covering previously constructed sections includes 22 jobs estimated at \$322,500. Ten of these are contract jobs.

Part II covers 10 jobs on sections of highway presently under construction. (Continued on page 141)



Another

"The performance of this machine speaks for itself," says Sidney Steel, paving superintendent of the Austin Paving Co. "Our records tell us this machine has long since paid for itself and it still has years of work left in it."

RECORD OF PERFORMANCE



Austin Paving Company of Dallas, Texas put down
5,580 sq. yards of concrete in one day
with single Flex-Plane Finisher!



Speed, power and flexibility, designed into the Flex-Plane, enabled it to easily keep pace with a dual drum paver while making two passes over the roadway, without benefit of a spreader.



**WORLD'S LARGEST BUILDER OF
CONCRETE FINISHING EQUIPMENT**

Paving Record for...

Flex-plane

● A Flex-Plane Portable Finishing Machine recently spread and finished 1860 lineal feet of 27-foot width street, with 6" integral curbs on both sides, in a single day for the Austin Paving Company of Dallas, Texas.

"Taking the concrete as it came from a single dual-drum paver, the Flex-Plane machine spread and finished it to a degree that required a minimum of hand finishing. It's a great piece of equipment!" says Sidney Steel, Paving Superintendent for Austin.

The Austin machine was equipped with integral curb attachments on both sides, and according to Steel, this feature alone saved them many pouring hours.

It's this kind of performance that has made the Flex-Plane, the industry's fastest selling and most desired finishing machine. Why not let our sales-engineers put you in touch with a Flex-Plane user in your area. His story will convince you that, if you do any roadway or runway paving at all, you can't afford to be without a Flex-Plane.

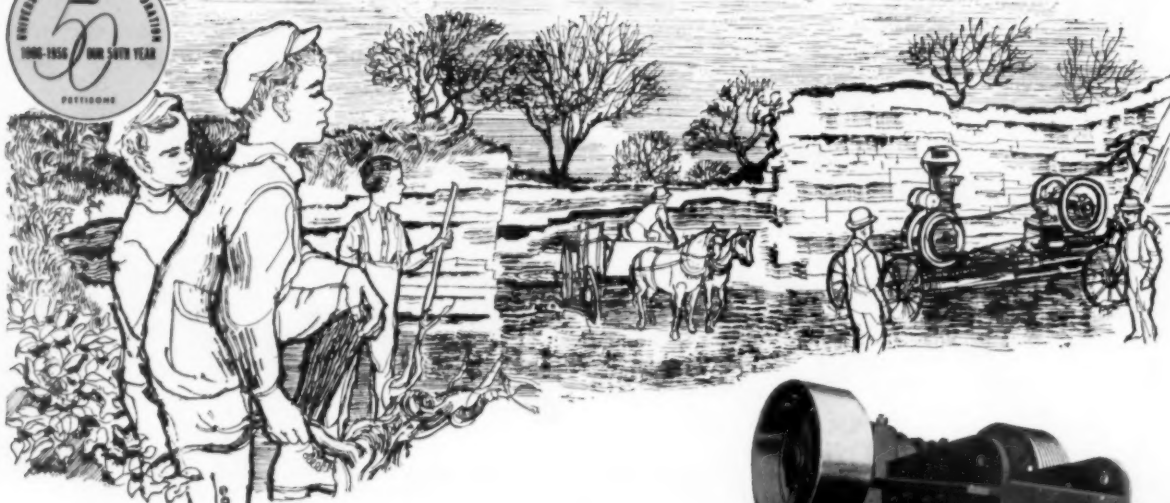
THE FLEXIBLE ROAD JOINT MACHINE COMPANY
6900 THOMAS ROAD WARREN, OHIO

Note how Flex-Plane's improved screed rolls the concrete into position. There is no shearing or pushing action. This eliminates a common cause of spalling. Note, also, the integral curbing attachment that further reduced costs for Austin.



... for more details circle 206, page 16

ROADS AND STREETS, April, 1956



TO THE BOYS WHO PLAYED IN THE QUARRIES IN 1906



Remember those carefree, boyhood days when you romped through the old stone quarry? Limestone cliffs were towering castle walls in young imaginations. Rock piles were western forts to hold against the Sioux.

The day they brought in the new crusher, you stopped your games to watch as the engine chugged to life. To you it was just another piece of machinery — and a wonderful target for stones when the men had gone. But the echoes barking off quarry walls that day were crying the birth of a new industry. Modern road-building had arrived!

Some of you never quite got the quarry out of your systems. You became quarry men and roadbuilders yourselves; and while you grew to manhood, the crusher you saw that day matured with you.

It was a German immigrant, E. A. Velde, who began its manufacture at Cedar Rapids, Iowa, in 1906. He combined the best feature of the Dodge crusher — a large bite at the receiving end of the jaw — with that of the Blake crusher — a large bite at the finishing end of the jaw. The result was the Universal overhead eccentric jaw crusher with "force feed" action — to deliver a dependably uniform product.

When America transformed her dirt roads into ribbons of concrete during the early 1900's, the uniformity of this crushed product created a huge demand for the Universal crusher and it was sold in carload lots the world over.

From this beginning, Universal became the producer of the most complete line of portable crushing, screening, washing and loading equipment in

the industry. Today, Universal offers the largest overhead eccentric jaw crusher on the market. The Universal 4448 — a product of 50 years in engineering design and manufacturing experience.

The boys who played in the quarries in 1906 and the Universal crusher came a long way together. Many more since then have grown up with the roadbuilding industry and like the men who laid our first highways have come to know and respect the quality of Universal equipment.

To these men, who demand crushing equipment soundly conceived, expertly designed and precisely engineered, we pledge they will find the products of the Universal Engineering Corporation as unexcelled for performance and reliability in the future as they have been in the past.



UNIVERSAL ENGINEERING CORPORATION

631 C Avenue N.W., Cedar Rapids, Iowa

A Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division St., Chicago 51, Illinois

... for more details circle 285, page 16



● Typical of the damage from flood which has bit deeply into Oregon's highway budget. (Left): Highway 101, along Pacific Coast, at site of washed-out culvert. (Right): Same highway, showing shoulder damage from over-topping.

When Floods Strike

(Continued from page 137)

tion. This \$274,000 expenditure will be done by the contractors as extra work.

Part III consists of 9 contract projects, described as corrective or preventive construction in those areas substantially damaged by the floods. These projects, totaling \$2,150,000, are also being submitted to the Bureau of Public Roads for approval for emergency aid.

● **Organization for Emergency.** Oregon state highway maintenance forces are organized to respond promptly in all highway blockade contingencies. The organization went into action in this emergency quickly and efficiently. Preliminary preparations under our plan of action, are made by the section crews when high water is forecast. High water stakes are placed along the shoulder to guide traffic where high water is anticipated. Flags, signs, flares and barricades are made ready and stored at strategic locations for quick use when needed. Equipment is made ready and workmen alerted.

As the water rises over the highway, traffic is permitted to proceed over flooded sections until the hazard from high or swift water, washouts or scour make it unsafe. Under certain conditions, a pilot vehicle leads traffic through water on a short section of inundated highway to control speed, guide drivers and maintain one-way traffic. When it is finally determined unsafe for further travel, the barricades are placed, signs and flares put up and traffic diverted over a detour, if one is available. Detour routes are carefully checked and found satisfactory for highway traffic and adequately signed before they are opened to highway traffic.

As soon as the high water recedes, the highway crews check and carefully inspect the highway for damage to shoulder, undermining of pavement, washouts around bridges, or other damage to structures or roadway that would be a hazard to traffic. Highways are opened as soon as possible to obtain safe-operating conditions, sometimes with one-way traffic at damaged locations and with much of the actual repair work deferred for performance while traffic is moving again. Necessary repairs are made, hazardous spots barricaded off, debris, drift, logs and trees cleared off the highway and from around bridge piers before the highway is reopened.

● **Cooperative Effort.** The extent of the disaster in the Grants Pass, Oakridge and Coos Bay area was such that much more than highways were involved, so that city and county forces, as well as civilian defense, U. S. Coast Guard, and other disaster bodies took an active part. Even with the best of planning, however, there are inevitably unexpected contingencies, and the highway maintenance men found themselves working long 12-

hour shifts flagging traffic, fighting drift, opening culverts, removing slides and helping stranded motorists, working in the water over their boot tops and continuing around the clock until the danger was over.

In many instances, state crews and equipment were not adequate to meet the need and privately owned equipment, available in the vicinity was rented with skilled operators and such additional employees as were necessary to expedite the removal of slides, the filling of washouts, etc., to effect early opening of essential highway routes.

In the Coos Bay area alone, reports show the following rented equipment working, Thursday, December 29: 6 tractors, 6 loaders, 3 graders, 1 dragline, 2 shovels, and 26 trucks. State highway short wave radio was a big help in the emergency.

STEED PROMOTED BY CUMMINS ENGINE. W. M. Steed, heretofore regional representative, central region Cummins Engine Co., Inc., Columbus, Ind., has been appointed regional manager, Southwest region, with offices at 411 West Fifth St., Los Angeles, Calif.

42nd Birthday For Corrugated Arch

● **OLD TIMER.** This old 10 by 5 foot corrugated arch "started in business" more than 42 years ago in San Diego County, California. It has been carrying traffic ever since. The first photograph shows the structure as it was in 1913; the latest in 1955. (Armco photo).



What's New in Equipment and Materials

Reader Service Coupon on Page 16



New Butler Automatic Roadbuilders' Plant

Concrete Batching Plant is 1-Man Operated

Complete automation for concrete batching — plus outstanding portability — is announced by Butler Bin Co., Waukesha, Wis. in their new automatic Roadbuilders' Plant. The new plant batches sand, cement, two sizes of stone, automatically and simultaneously with such speed that it is stated to easily pace two 34E dual drum pavers. Batching of all materials is controlled by one man, stationed at the cement batcher, operating a simple set of push buttons. If desired, the truck driver can operate the sand and aggregate batchers separately without leaving his cab — through push-button controls mounted on the bin columns.

The new Butler automatic Roadbuilders' Plant is stated to assure quality control and absolute accuracy. Two batches of sand, cement and both sizes of stone are weighed and discharged simultaneously. Every batch must be right because all gates are so interlocked that they cannot discharge until the correct weight is in the hopper, nor can the hoppers be charged until all material is out. Master controls governing any selected and specified batch proportions are located at the rear of the bin. These are pre-set for the concrete specifications and need not be touched again until resetting for new specifications, when they can be easily changed.

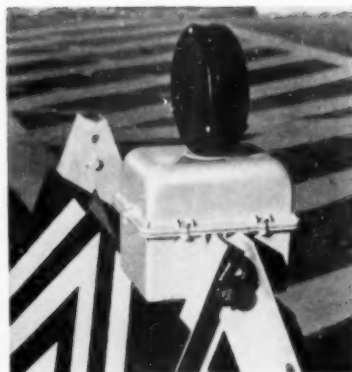
New speed in assembly, new ease in portability and erection are built into every Butler Unit. Bulk cement bins have hinge-and-pin attachments for the sup-

porting column that can be attached on the ground so that the columns swing into place as the crane lifts the bin. In transport the complete unit ships in one piece. Aggregate bins are similarly designed with columns in two sets of panels. Bracing is preattached to the panels for easy field bolting. The complete batcher is shipped as a self-contained package. Wiring is part of the package and remains intact in transport, requiring simple, quick "plug-in" to connectors. Cement elevators are in two sections with chain and buckets attached, ready to connect and erect. Entire unit can be set up in a few hours.

For more information circle 106 on Service Coupon Page 16 and mail now.

2-Way Flasher Light

A new 2-Way flasher light stated to offer 25% greater light intensity for warning motorists or pedestrians of road



2-Way Flasher Light

and street obstructions, construction projects and other safety hazards is being introduced by the Gen-A-Matic Corporation, 14741 Bessemer St., Van Nuys, Calif. Approximately 7x5x8 in. in size, the Gen-A-Matic 2-Way flasher light uses a new Neon tube, said to offer far greater visibility, and a non-fading, shatterproof Stimsonite optical lucite lens for maximum intensity of the beam. The Neon tube is shock-mounted in a two-way directional head that rotates easily to any desired position.

For more information circle 107 on Service Coupon Page 16 and mail now.

Portable Batch Type Asphalt Plant

A new, completely portable batch type asphalt plant, announced by Herthington & Bernes, Inc. 701 Kentucky Ave., Indianapolis 7, Ind., has a capacity range of 100 to 120 tons per hour.

The plant, designated as the H&B Mobile 40, has been designed for ease of erection, complete portability and flexible set-up arrangement. All units are wheel mounted, and no crane is needed for erection. All piping and wiring are permanently installed, with quick disconnects.

The mobile 40 offers all the advantages of batch type production together with complete portability. It meets all state specifications. There are no shafts, chains, gears or universal joints. All remotely located units are driven with electric motors. The complete plant — tanks, oil heater, power units, piping, etc. — is available from one source.

For more information circle 108 on Service Coupon Page 16 and mail now.



H & B Mobile 40 Asphalt Plant

Truck Crane Has Telescopic Boom

A boom that will telescope hydraulically with a full-capacity load is one of the improvements in the new Model 60 Pitman Hydra-Lift being introduced by Pitman Manufacturing Co., 300 West 79th Terrace, Kansas City, Mo. The Model 60 is the result of a complete re-designing of the Model "B" Pitman Hydra-Lift, 6400-lb. capacity truck crane requiring only 40 in. of space behind a truck cab. Hydra-Lift installs on any truck 2 tons or larger. While retaining all the desirable features of the former Model "B", the new Model 60 Hydra-Lift incorporates these important basic improvements:

Hydraulic telescopic boom. With this boom, loads can be positioned in spots which it would be virtually impossible to reach with any type of standard boom. The hydraulic boom telescopes from 17 to 27 ft. The standard tubular boom telescopes manually from 12 to 17 to 22 ft.

Hydraulically-operated outriggers standard equipment. Inside the truck or out, all the operator need do to set the outriggers is push two levers which he can easily reach without moving from his regular operating station. Full boom topping capacity. Now full-capacity loads can be raised or lowered with the boom. For heavy loads it formerly was necessary to first position the boom, then raise the loads with the loadline. Now the heaviest loads can be raised either with the loadline or the boom, greatly increasing versatility of load handling.



Model 60 Pitman Hydra-Lift

For more information circle 109 on Service Coupon this page and mail now.

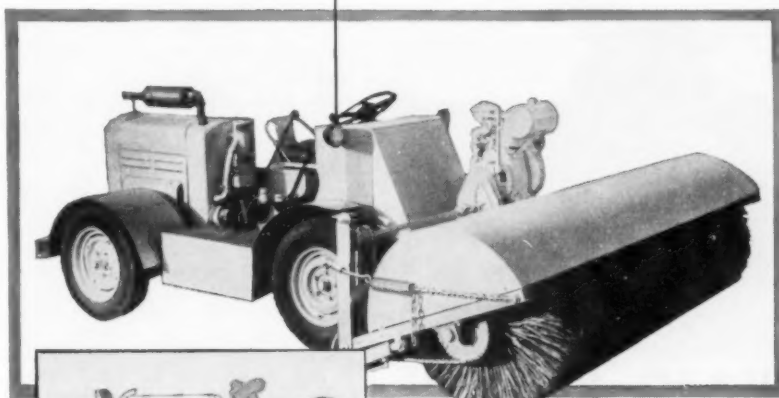
Compact Hydraulic Power Unit

A complete and extremely compact hydraulic power unit, with 6 or 12 volt DC motor drive, pump, control valve and tank and designed for applications on mobile equipment such as snow plows, hoists, booms, tail gates, etc., has been developed by Wisconsin Hydraulics, Inc., 3165 North 30 St., Milwaukee 16, Wis. It is named the Lectro Lift. A rectangular housing of cast aluminum serves as the reservoir for 110 cu. in. of oil. The electric motor is flange-mounted to one end of the housing and the pump control valve to the opposite end. All working parts are totally enclosed for full protection from outside elements.

Control is obtained by one lever which can also accommodate a clevis for remote control linkage. It has three operating positions — raise, lower and spring return to hold. Lowering control is

LITTLE GIANT Self-Propelled SP-C Sweeper

A Big Sweeping Job in a Low Cost Package



Independent Brush assembly can be installed on any prime mover by use of adaptable hitch plate and support channels. Ask your Little Giant dealer for facts on the low cost SP-C or Independent Brush assembly... or write direct.

Power, speed and the ability to sweep cleanly fit the money-saving SP-C for any sweeping work.

Prime mover has high speed for moves from job-to-job; a choice of speeds for sweeping. Weight is concentrated on front drive wheels making steering easy.

Independently-driven brush maintains constant, positive sweeping action regardless of forward speed. Entire brush assembly can be dismantled in two minutes.

The SP-C...

- Speeds to 40 MPH
- Prime power—48 HP water-cooled engine; brush power—Wisconsin A.E.N. engine
- 6-volt electric system
- Hydraulic brakes
- Turns in 22 feet
- Hydraulic brush control
- Fully adjustable brush
- Choice of 6', 7' or 8' brush



**LITTLE GIANT
PRODUCTS, INC.**

1600 N. ADAMS • PEORIA, ILLINOIS

Manufacturers of quality products since 1919.

... for more details circle 292, page 16

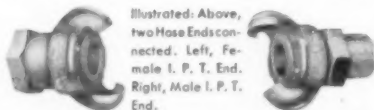
*Quick Action...and
Tight, Pressure-
Proof Connections*



"AIR KING" Quick-Acting Universal HOSE COUPLING

**FOR COMPRESSORS, ALL TYPES
OF AIR TOOLS, WATER, OIL
AND SPRAY SERVICE**

This versatile coupling is built along plain, rugged lines to assure long, trouble-free service under severest working conditions.

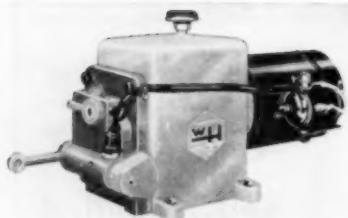


The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends within the coupling's size range, and are locked by pressing together and applying a quarter-turn. Equipped with patented Safety Locking Device. Bronze or rustproofed malleable iron, in sizes up to 1".

Stocked by Manufacturers and Distributors
of Industrial Rubber Products

DIXON
Valve & Coupling Co.
GENERAL OFFICES & FACTORY—PHILADELPHIA 22, PA.
BRANCHES—CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON
DIXON VALVE & COUPLING CO., LTD. TORONTO. Associate Companies:
Rock Valve Company, Inc., Quakertown, Pa. • Precision Drawn Steel Company, Camden, N.J.

... for more details circle 287, page 16



Lectro Lift Hydraulic Power Unit

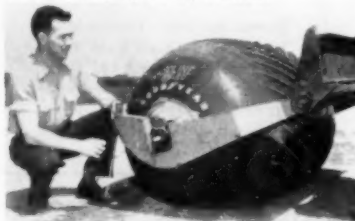
through a throttling valve for varying the rate of return. The unit may be mounted vertically, with motor end up, or horizontally.

For more information circle 110 on
Service Coupon Page 16 and mail now.

Rubber Tank for Bulk Transportation of Liquids

A watermelon-shaped rubber tank has been developed by the Aviation Products Division of the Goodyear Tire & Rubber Co., Akron 16, O. for bulk transportation and storage of fuels and other liquids. Called the Rolli-Tanker, the container can be rolled over ground, floated in water and dropped without bursting.

Rolli-Tankers are unconventionally-shaped tires of nylon cord and tread stock construction with fuel-proof inner lining. They can be built in a range of sizes. To date the company has tested 3½x5-ft. tanks that weigh 40 lb. deflated and give the appearance of oversized watermelons when loaded to 250-gal. capacity. Mounted on hubs and axles to permit easy handling, Rolli-Tankers may be towed manually or by vehicle.



Rolli-Tanker Attached to Light Truck

For more information circle 111 on
Service Coupon Page 16 and mail now.

International Improves Payscraper Line

Design changes brought about by close customer-engineering cooperation in the field on jobs is reflected in the new im-

proved 1956 self-propelled, rubber-tired Payscraper line of International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. The two new Payscraper models now in production, with deliveries started early in March, are the 262-hp "75" and the 172-hp "55."

The model 75 capacity has been increased to 20 cu. yd. heaped and the model 55 to 14 cu. yd. heaped. Other changes now engineered in the new units are: (1) straight-back bowl; (2) lower draft frame; (3) greater visibility; (4) new cerametallic clutch facing (on the "75"); (5) higher apron lift; (6) bigger push block; and (7) improved ejector.

The back of the Payscraper bowl has been redesigned similar to a dozer blade. The dirt boils back into the bowl from the cutting edge, fills the corners, and heaps a full load in seconds.

A new cerametallic clutch is made of a combination of powdered metals and ceramic materials similar to those used in jet airplane brakes. The new clutch provides more positive clutch engagement and reduces slippage. Adjustment is less frequent, and clutch life has been lengthened considerably.

The apron lift is now higher than in the previous models, which assures speedy ejection of all material. The apron closes fast with guillotine-like action. Arms are now outside the bowl, away from the dirt, and allow the apron to close quickly and positively.

A wider and bigger push block permits the operator of the push tractor to make positive contact with minimum effort. The push block is properly placed to direct pusher thrust most efficiently. Wider push block also helps to protect tires and the rear of the scraper.

Visibility has been improved in the 1956 Payscraper line. The lower draft frame gives the operator improved vision of both the bowl and the push tractor. The operator sits on a thick foam-rubber seat with operating controls grouped conveniently within easy reach. Longer, wider fenders give added protection not only to the operator, but the unit as well.

Heavy-duty, two-shoe air brakes are synchronized on both tractor and scraper wheels. In addition, an auxiliary hand brake provides individual braking of the drive wheels for "walking" out of rough going. Multiple-disc cable control assures fast, efficient scraper action. Wrap-around brake bands with large friction areas assure positive hold. Effortless hydraulic power steering is assured by exclusive



International "75" Payscraper

International Hydro-Steer. With Hydro-Steer, the operator is in complete control of the machine at all times with the assured advantages of safety and comfort. The "75" and "55" Payscrapers have been completely field tested.

For more information circle 112 on Service Coupon Page 16 and mail now.

Portable LP Gas Heaters

A new line of portable LP gas heaters for contractors has been introduced by Cimco, Box 422, Marshalltown, Iowa. Cimco's "Thrifty" Jet salamander, shown herewith, can be used without safety controls and unvented for outside work, such as on bridge pours. Included is a U. L. approved regulator. This model can be ordered with any safety controls desired and with a chimney vent for heating inside jobs where 100 per cent clean air is necessary.

The Cimco "Thrifty" Jet salamander eliminates worry over electrical plug-in connections. Worker can pick it up and walk to any location where he needs heat.



Cimco "Thrifty" Jet Salamander

For more information circle 113 on Service Coupon Page 16 and mail now.

Underbody Scarifier Attachment

A new accessory for use with Seaman Trav-L-Plants and Pulvi-Mixers, announced by Seaman-Andwall Corporation, 291 North 25th St., Milwaukee, Wis., is an inexpensive underbody scarifier attachment, with six heavy duty teeth and header board or curb shoe, for light scarification in combination with in-place mixing. Easily bolted amidships between front and rear wheels of the Seaman Pulvi-Mixer or Trav-L-Plant, it is hydraulically controlled by the operator.



New Seaman-Andwall Scarifier Attachment

For more information circle 114 on Service Coupon Page 16 and mail now.

Here's how to CUT DOWN-TIME

with



hydraulic
power
units

Portable Pulling and
Installing Units Save Time on

Thousands of Jobs in Shop or Field

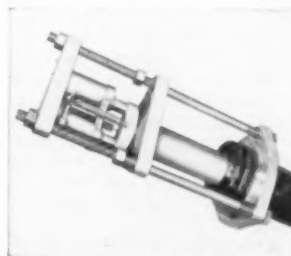


One of hundreds of jobs done easier and faster with OTC hydraulic pulling units. Here a 50 ton Power Twin unit is removing a crawler tractor sprocket.

OTC tools save time because they go to work fast—they fit the work and one man can set the pulling units in position in minutes. Then the powerful ram goes to work saving hours and sometimes days in repairing all types of field equipment.

OTC famous hydraulic tools offer up to 100 tons of power to instantly pull or install parts without distortion or breakage. For more than 20 years OTC tool designers have worked with factory service engineers building these tools to speed maintenance in shop or field. Sets are available for all makes of tractors and other equipment.

Whatever your special problem, let us help you. OTC manufactures the most complete line of pulling tools available. Start now to save time and money. Get acquainted with OTC.



OTC 50 ton unit—the only tool that can remove and install International TD 24 track and accumulator spring in the field.

OTC 100 ton Power Twin hydraulic unit removing pivot shaft from a TD 18 tractor.



SEND FOR NEW FREE HYDRAULIC BOOKLET

OWATONNA TOOL COMPANY

435 CEDAR STREET

OWATONNA, MINNESOTA

... for more details circle 246, page 16



One of Many Barber-Greene BatchOmatic Plants in Operation in 1955

Two New Plants Added to "BatchOmatic" Series

Barber-Greene Co. has announced that their "BatchOmatic" line of automatic, bituminous batch plants, will now encompass 2,000, 4,000 and 6,000 lb. models. Their 4,000 lb. model was introduced in 1955, marking the company's first offering in the batch plant field.

The new units employ the same features of simultaneous weighing of all sizes of aggregate; instant change from fully automatic to manual operation; the "Dyna-Mix" pugmill and instant, positive inspection of aggregate gradation and weight.

The automatic measuring of all sizes of aggregate and the bitumen in the "BatchOmatic" plant series, is made possible by the basic design of the plant's measuring system which is, in itself, inherently automatic. As all of the aggregate gates are opened simultaneously, each weigh hopper will measure only the required batch of aggregate regardless of how long the gates are left open. For these reasons, the plant's control system employs simple electric "on-off" switches and timers and does not incorporate any

electronic equipment. At the operator's discretion, the plant may be switched instantly from a repetitive cycle automatic operation to manual operation, so that a special batch may be weighed out in the conventional manner.

A complete range of sizes of dryers, dust collectors, elevators, and aggregate cold feed systems for the "BatchOmatic" plants is available. These are the same units which are also used with Barber-Greene's continuous mix asphalt plants which range in capacity from 15 to over 200 tons per hour.

Specifications and literature including a booklet on operating principles, on all of the "BatchOmatic" asphalt plants may be obtained by writing to the Barber-Greene Co., 400 No. Highland Ave., Aurora, Ill.

For more information circle 115 on Service Coupon Page 16 and mail now.

Curb forming machine travels 7½ ft./min.

Seen in action here is the new Stephens-Canfield "curber" curb laying machine, powered by a Wisconsin AKN engine with clutch. With this unit, which

Stephens-Canfield curb machine in action.



uses no forms and is self-propelling, asphaltic or portland cement concrete is fed into the hopper, which extrudes the material through a worm gear into the curb mold under pressure. Compaction pressure causes the machine to move forward.

The operator merely guides the Curber. Lays straight or curved curbs on sub-grade base or finished pavement. Adjustable wheels allow Curber to be raised or lowered to permit pouring of curbing in various sizes from 6 in. to 12 in. high. Interchangeable molds provide choice of 18 different shapes from 6 in. to 12 in. high and 7 in. to 10 in. base width. Lays up to 1,800 ft. per day without forms.

The Curber is made by E. L. Hardin Associates, Inc., Salisbury, N.C.

For more information circle 116 on Service Coupon Page 16 and mail now.

Removable Gooseneck Trailers

Simplicity of design and ease of operation are major features claimed for Model GPR removable gooseneck trailers engineered by Transport Trailers, Inc., Cedar Rapids, Iowa. Developed to provide greater safety and convenience in loading and unloading heavy equipment for transport in congested areas, these removable gooseneck trailers are available with flat or drop platforms, and as beam trailers with or without removable side platforms and telescoping outriggers.

The removable gooseneck is easily attached through a simple, positive gooseneck connection which saves loading and unloading time. High strength design eliminates unnecessary added weight for maximum legal payload. Other important features include electrically welded wide-flange-beam frame construction; tandem, triple, or trunnion axle assemblies with



Model GPR Removable Gooseneck Trailers

heavy duty roller bearings; 15 in. or 20 in. wheels; heavy duty internal expanding brakes; and optional beavertail rear end designs. Capacities range from 15 through 60 tons for standard production models with special engineered units up through 100 tons.

For more information circle 117 on Service Coupon Page 16 and mail now.

Mobile Transistorized Dynamic Mike

A transistorized dynamic microphone for mobile radio application has been announced by Motorola Communications & Electronics, Inc., 4501 West Augusta

(Continued on page 149)

Job Supervision

(Continued from page 87)

contractor which will appear on your next bid whether you like it or not.

"In the past your district engineer walked every job before it was designed or let; he knew the difficulties which would be encountered. When the resident engineer called him, a decision was made on the spot.

"Now we are lucky to ever see the district engineer on the job. You have saddled him with so many paper tasks that it is impossible for him to do his former job. I was once superintendent of a bridge job which had a monthly visit from the commissioner and a weekly one from the district engineer. The job never waited for line or grade, or decisions, and at the completion of the job, the final quantities were finished so that the final estimate could be paid. Believe me, a contractor who was assured of such treatment nowadays, would really fight to be in there with the low bid! . . ."

"Another innovation which is costing you a barrel of money is the increasing use of consulting engineering firms to do projects of certain kinds which you do so much better and more cheaply than they can. I know your answer to this, 'We do not have the organization. Our scale of pay is too low to hire good men.'

Paying Twice as Much

"That is not a valid reason for paying twice as much for engineering and obtaining in return the headaches from their inexperience, the delays, the continual bickering which has been occasioned by their use. Being an engineer, my hat is off to those of my profession whose abilities have led them to design the complicated bridges, tunnels, dams, etc., but for the run-of-the-mill simple bridge and highway work, there are none so experienced nor better qualified to do these jobs than our own highway departments.

"You must realize that the contractor adds on a percentage to the bid to cover the cost of dealing through a second party."

* * *

"A major point is design. After all, is the bridge over the highway going to be used as a monument for future generations? Or is it to be a practical, useful facility? I say do away with the monuments, the fancy stonework, the tapered piers, the pretty but useless haunches in favor of simple de-

signs, simplified formwork, and spend the money you save on better drainage and clearing right of way.

Save Thousands on Borrow

"You are spending large sums to have the contractors furnish you borrow for roads. If you will buy wider right-of-ways, widen out cuts or purchase borrow pits when purchasing right-of-ways, you can save hundreds of thousands of dollars.

"After a job is let, then the adjacent property owners can gouge the contractor. The contractor knows this. He can't gamble on items of this size, so he bids high.

Get District Engineers Out of Their Chairs and into the Field Offener

Contractors on the program really spoke out at the AHONAS meeting at Boston. A panel of them made a hard-hitting attack on highway department practices which, they declared, are boosting construction costs and consuming unnecessary time.

There'll be plenty of new problems in gearing the roadbuilding industry for a greatly expanded national highway program, these speakers observed, but first attention should be given to the existing need for highway officials and contractors to work closer together in problems of design and construction.

At this panel session a packed roomful of delegates — primarily state road men — sat silent when one of the panelists, Burl A. Wilder, general superintendent of the Savin Construction Co., New Haven, Conn., declared:

"Why is it we so seldom see your district engineer on the job? You have saddled him with so much paper work he can't do his real job!"

But they applauded when he said, "Another innovation that is costing you a barrel of money is your increasing use of consulting engineers to handle projects you can do so much better and more cheaply than they can. . . You must realize that the contractor . . . adds a percentage to his bid to cover the cost of dealing through a second party."

Another speaker, Hugh Connelly, executive director of the New Jersey Contractors Association, told the assembly:

"We have to find some way of eliminating delays on the job. Every time an inspector holds up work for an insignificant or an avoidable reason he is costing the contractor un-

"We have had jobs where it would have been cheaper to widen out rock cuts than to buy and haul borrow. I see no objection to the states inclusion in their special provisions of approved sources of materials for projects."

* * *

"Now you say to me, 'What would you do about these things?' I would equip a practical engineer with a red pencil and have him go through every job before bidding, cutting out the expensive unnecessary things, simplifying structures, and doing every-

(Continued on page 153)

told amounts of money. The inspector who thinks the contractor can adjust to these conditions is badly mistaken. More often than not the unions run our jobs and the contractor just keeps the books and signs the checks."

Reasons listed by another panel member for inefficiency in roadbuilding were, (1) ill-timed advertising of jobs, (2) fluctuating programs rather than orderly planning, (3) delays in right-of-way acquisition, (4) delays in utility clearance, and (5) increasing frequency of job changes. Leroy W. Kern, of Harry T. Campbell Sons Corp., contractors of Baltimore, Md., pointed out that roadbuilding can be economical only if the contractor's production line are kept running steadily and without costly stops and starts and other "man-made obstacles."

"What's going to happen to the national road program if these man-made obstacles persist? You can depend upon contractors getting the most efficiency possible out of their organizations, but you have to create the proper production conditions," he said.

Philip V. Corey, president of the W. H. Hinman Co., of Augusta, Me., urged the highway officials to upgrade their district engineers, pay them better and free them of petty administrative tasks.

John O. Morton, commissioner of highways for New Hampshire, was elected president of AHONAS for 1957, to succeed Russell H. McCain, Maryland State Roads Commissioner. Earl J. Mattis, superintendent of highways for St. Laurence County, N. Y., was elected vice president; and Kenneth D. Rice, secretary of the New Jersey Highway Department, was elected secretary.

**New
HOMELITE
EZ**



...the Direct-Drive CHAIN SAW with ALL of the features YOU want

*Only 19 pounds
Full 5 Horsepower
New Low Cost
Faster Cutting Speeds*

AND WITH THE NEW HOMELITE FLOATING POWER, you'll find handling ease you never knew before. The all-angle, any-position carburetor gives you full power cutting — whether you're felling, bucking, notching, limbing or under-cutting.

Floating Power lets you cut with less effort, less fatigue than any other chain saw. Because the Homelite EZ weighs only 19 pounds you can carry it anywhere. Its full 5 horsepower cuts through 8" Oak in 5 seconds and 18" Pine in 14 seconds. And the three bar sizes — 17", 21" and 25" will handle trees up to 3 feet in diameter.

The EZ brings you Homelite dependability at a new low cost — not just a low initial cost, but also lower maintenance and operating costs than any other direct-drive chain saw.

See this new floating power now! Try it and you'll know why the Homelite EZ offers easier cutting, faster cutting, more profitable cutting for your dollar.

Ask your Homelite dealer for a free demonstration. Also ask about the convenient time payment plan.



FREE!

Win a Homelite

24 Homelite EZ chain saws being given away each month. Nothing to buy. Nothing to write. No obligation. Just ask your dealer how you can win. See him today!

**A Complete Line of Chain Saws
for every cutting job.**

Manufacturers of
Carryable Chain Saws • Pumps • Generators • Blowers

HOMELITE

7004 RIVERDALE AVE., PORT CHESTER, N. Y.

A DIVISION OF TEXTRON AMERICAN, INC.

Canadian Distributors:

Terry Machinery Co., Ltd., Toronto, Montreal, Vancouver, Ottawa, Edmonton, Moncton

... for more details circle 219, page 16

ROADS AND STREETS, April, 1956



Gar Woods Buckeye 330 Ditcher is 16 ft. high over uprights and 53½ ft. long.

Blvd., Chicago 51, Ill. The new accessory reportedly provides unprecedented mobile transmission quality comparable to that of a base station.

The microphone features a rugged specially designed dynamic element employed in conjunction with a built-in transistor preamplifier. Unexcelled voice intelligibility from the mobile unit is said to be readily demonstrable.

The transistor preamplifier, an integral part of the microphone, boosts the dynamic output to conventional transmitter input level, eliminating the need for a preamplification at the transmitter. This technique overcomes the noise pick-up problem inherent in mobile installations.

The amplifier draws its power from the conventional "talking current" supply. Currently offered as a replacement item or an optional accessory with Motorola equipment, the color-styled all-metal palm-size device is directly interchangeable with Motorola carbon microphones now in use.

The new development is also available as a dual purpose dynamic "speaker-mike" which functions both as a full-output communications-type loud speaker as well as a dynamic microphone. It can be conveniently mounted or held near the operator's ear to overcome high ambient noise.

For more information circle 118 on Service Coupon Page 16 and mail now.

Ditcher Excavates 600 cu. yd. Per Hour

A new ditching machine, the Gar Wood-Buckeye 330, announced by Gar Wood Industries, Inc., Wayne, Mich., is stated to excavate 600 cu. yd. of dirt per hour and to cut a trench 11 ft., 3 in. deep and 5 ft. 4 in. wide. The 330 was designed for a heavy duty pipe-line ditcher that also could be adopted for deep sewer work. It also can be adopted for open-ditch type irrigation work, digging a trapezoidal ditch with a top width of 19 ft., a depth of 8 ft. and a bottom width of 3½ ft.

The new ditcher is stated to incorporate many advanced design features never before used in ditching machines. A hydraulic power steering arrangement provides the operator with fingertip steering control for the 110,000 lb. machine. The 330 has a combination of 30 in. tracks in the rear and 30 in. pneumatic tires in front.

Power from a Caterpillar diesel rated at 220 operating horsepower flows through a torque converter to a unique arrangement of two Allison torquematic transmissions. The transmissions provide the speed ratios for the traction drive and a choice of 15 speeds for the digging wheel drive.

The 17 ft. 6 in. diameter digging wheel is lowered or raised by two individual hydraulic hoist units. Each has separate controls to allow independent or simultaneous operation. Either the front or rear of the digging wheel can be raised or lowered.

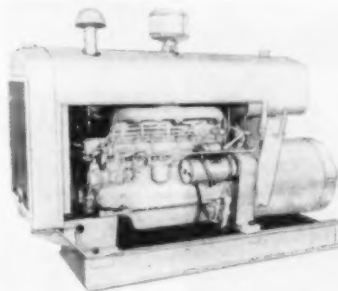
The dirt conveyor is hydraulically driven at variable speeds. The conveyor operates independently of any other function. Another independent hydraulic unit controls the elevation of the conveyor.

Only one man is required to operate the machine. All controls are located in the operator's cab and the majority of these are of the "fingertip" type.

For more information circle 119 on Service Coupon Page 16 and mail now.

Lightweight Diesel Electric Sets

A new series of lightweight, large capacity generating sets has been introduced by Universal Motor Co., 540 Universal Drive, Oshkosh, Wis. This is a com-



Six Cylinder Diesel Series

panion series to the recently announced Universal line of diesel generators offered in 1200 r.p.m. speed. The new 1800 models are produced in 10, 15, 25 and 35 K.W., and can be furnished with various controls to meet every job requirement.

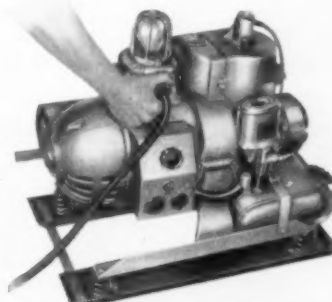
For more information circle 120 on Service Coupon Page 16 and mail now.

CHOOSE from a full line of **HOMELITE** Carryable Construction Equipment



SELF-PRIMING CENTRIFUGAL AND DIAPHRAGM PUMPS

Sizes: 1½" to 3" — capacities to 15,000 g.p.h. for dewatering and water supply.



ELECTRIC GENERATOR SETS FOR TOOLS AND LIGHTS

Complete range of sizes and voltages up to 5,000 watts.



LIGHTWEIGHT POWERFUL ONE-MAN CHAIN SAWS

Complete line of saws with clearing and brushcutter attachments for every woodcutting job.

HOMELITE

A DIVISION OF TEXTRON AMERICAN, INC.
PORT CHESTER, N. Y.

Labor and Time Savings on the Job!

HANDLE MANY JOBS WITH THESE ATTACHMENTS



Strike-off Box Attachment. For road widening fill and asphalt paving. Adjustable on three sides to 6" above grade. Strike-off blade extends 4'. Remove with one pin.



Conveyor Extension Attachment permits backfilling 24" high curb or placing material over 7' from wheels. Take-off drive. Unit is 4' long with independent belt.

Distributors:
Write for information on available territories



POWER-PACK BACKFILL

Performance proved! Everywhere POWER-PACK has been used great savings result in labor and time . . . also you can expect a better fill with no material wasted! Only one man operating the POWER-PACK can power-backfill curbing, trenches, and pipelines at the rate of **three tons per minute!** This equipment has actually paid for itself on a single job.

Ruggedly built for long service. Easily portable with four swivel wheels and a sure, quick hitch. Can be used with any size dump truck including trailer dumps. Dependable 8.25 Wisconsin engine. Heavy duty belt.

To save time and money investigate POWER-PACK today! Write for booklet or phone your distributor.

POWER-PACK CONVEYOR CO.

13910 Aspinwall Avenue

Cleveland 10, Ohio

... for more details circle 295, page 16

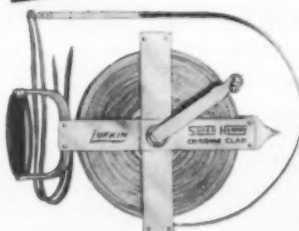
WHY SUPER HI-WAY Drag Tapes last longer



LUFKIN

SUPER HI-WAY DRAG TAPE

EASY TO READ MARKINGS THAT ARE DURABLE



398

Extra heavy tape steel is etched away to leave full strength line with markings raised in bold relief. Raised protective edges and jet black background provide long wear and make markings easy to read. Chrome Clad finish resists rust and corrosion, won't chip, crack or peel. Each foot marked — end feet graduated to 100ths ft. 100 - 200 - 300 foot lengths.

BUY LUFKIN

TAPES • RULES
PRECISION TOOLS
FROM YOUR SUPPLY STORE

THE LUFKIN RULE COMPANY
Saginaw, Michigan

BETTER MEASURE WITH LUFKIN

... for more details circle 236, page 16

Sod Cutters Have New Features

Ryan Landscape Equipment Co., 871 Edgerton St., St. Paul, Minn. is now in full production of its 1956 Models. New features of this years sod cutters include 2-speed transmission, quick-acting depth and blade angle adjustments, completely sealed gear case, larger engines on 18 in. and 24 in. machines and other improvements all designed for easier and more efficient sod cutting.

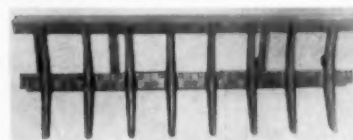


Ryan Sod Cutter

For more information circle 121 on Service Coupon Page 16 and mail now.

Rake Increases Land Clearing Capacity of Tractors

A Fleco rake designed for use with a Caterpillar D4 tractor equipped with No. 4 Tool Bar, is stated to increase the clearing and raking capacity of a Caterpillar D4 Tractor. This rake, developed by Fleco Corporation, Jacksonville, Fla., is matched to the speed and power of the D4 and can be easily installed on the swinging draft members of the No. 4 tool bar. The Fleco rake penetrates up to 12 in. of ground and combs roots, branches and trees from the soil, stacking the debris in dirt-free piles that can be readily burned. It can also be used for removal of trees within the capacity of the D4 Tractor.



Fleco Rake

For more information circle 122 on Service Coupon page 16 and mail now.

Hercules Announces 12 New Engines

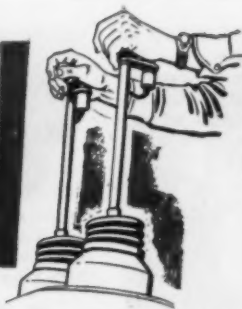
Production is underway by Hercules Motors Corporation, Canton, O., on four new series of gasoline and diesel engines. The series include 12 models in four and six-cylinder construction.

The new line of overhead valve gasoline engines, known as the "G.O." Series, is available in three different bore sizes in both four and six-cylinder construction.

The new line of direct injection diesels, known as the "D.D." Series also is available in three different bore sizes in four and six-cylinder construction to match the "G.O." Series.

For more information circle 123 on Service Coupon Page 16 and mail now.

NOW



ONLY 2 LEVERS FOR ALL OPERATIONS

LORAIN Full-Metered "AIR-EASE" CONTROLS

Reduce Operator Effort ...
Provide Better Control

The latest Lorain advance brings a new era of operation to shovel-crane operators and owners. Now, Full-Metered "Air-Ease" operation controls all friction clutches. Now, two simplified hand levers replace the bank of awkward multiple levers of the past. These two levers put "Metered Air" to work feeding power to the clutches at any rate of flow desired. All of the old time "feel" and response is there, lever manipulation is simplified, effort is greatly reduced, speed is increased, control is more accurate. The range of air flow and power is at the precise command of the operator.

To the operator, here is a new day of operating ease and lack of fatigue. To the owner, no feature in years has added so greatly to production.

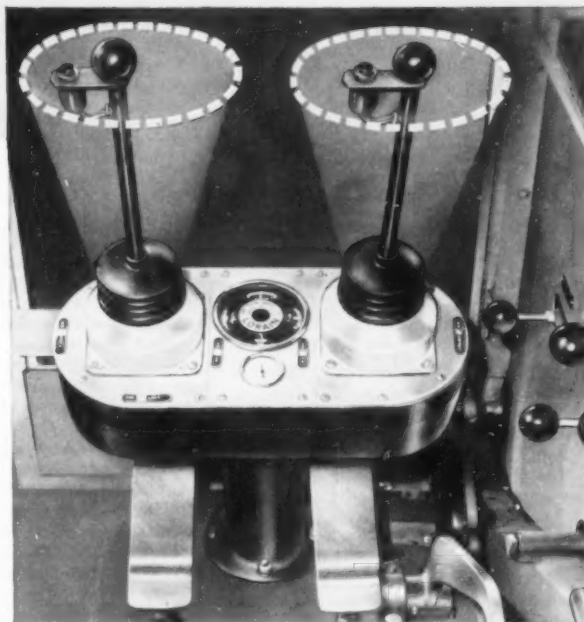
To be the first to put the new 2-lever "Air-Ease" control to work on your jobs, see your Thew-Lorain Distributor. Here is a feature your next shovel-crane should have!

THE THEW SHOVEL CO., LORAIN, OHIO



... for more details circle 263, page 16

ROADS AND STREETS, April, 1956



LEFT LEVER — Yellow circle indicates the "wobble stick" action. By positioning lever in various directions within this circle, operator can swing the turntable right or left, or raise the boom up or down. Intermediate positions within the circle combine any of these operations.

RIGHT LEVER — In the very same rotating action, the operator can control these operations: (1) Main Hoist; (2) Secondary Hoist; (3) Clamshell Holding; (4) Drag or Hoe Drag-in; (5) Shovel Crowd-Retract; (6) Third Drum; (7) Power Load Lowering.

All operations described above are controlled by moving these levers forward or backward, from side to side for single operations, or "quartering" the levers for combined operations. Air booster operation of Hoist Brakes is available.

IMPROVED VISIBILITY

This view shows the clean, simple, 2-lever control arrangement in the operator's cab. Operator gets full view of work area, particularly on deep digging operations.

Intermittently used Full Air controls for crawler steering, turntable swing lock, tread-travel lock, shifting of travel-swing jaw clutches, are conveniently located on panel to right of operator.

The new 2-lever Full-Metered "Air-Ease" controls are now available on eight Lorain models, both crawler and rubber-tire mountings, in 20 to 30-ton range.



THEW LORAIN®

Shovel-Crane Mounting Eliminates Center Pin, Rollers

A new method of attaching shovel-crane turntables to crawler or rubber-tire mountings, known as the "Shear Ball" mounting, has been announced by The Thew Shovel Co., Lorain, Ohio.

It is claimed this new mounting eliminates all need for top or hook type turntable rollers, for center pins and nuts, for exposed roller paths, and for centering gudgeons, along with the maintenance and adjustment usually associated



Shear Ball Mounting for Shovel-Cranes

with these items. This radically different mounting has been under development for seven years and has had intensive field testing under all types of shovel, hoe and crane conditions.

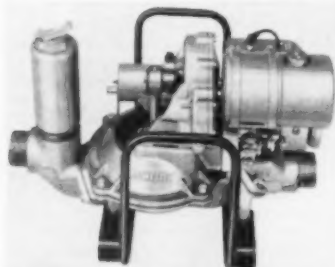
The "Shear Ball" mounting is at present standard equipment on two models of Lorain cranes and is available as optional equipment on others in the line. Application of the "Shear Ball" mounting is stated to result in more effortless swing with less power needed for swing operation, plus longer, trouble-free life and removal of all need for periodic adjustments.

For more information circle 149 on Service Coupon Page 16 and mail now.

Diaphragm Pump

A new diaphragm pump, Model 20-DP3, announced by Homelite, 75 Riverdale Ave., Port Chester, N. Y., has a capacity of 5000 gal. per hour and weighs 120 lb. It is stated the new pump will run 6 hours at full capacity on 1 gal. of fuel.

Powered by a Homelite single-cylinder, 2-cycle gasoline engine, the new Model 20DP3 operates at engine speeds between 1500 and 2850 rpm. Throttle on the



Homelite Model 20DP3 Diaphragm Pump

float-type carburetor, can be hand-regulated to adjust engine speed for different pumping conditions — slow speed for seepage control, full speed for capacity pumping. At full throttle the pump makes approximately 63 strokes per minute.

Completely self-priming, the 20DP3

will dry-prime up to 15 ft. and do it in 15 seconds! Pumping capacity of the 20-DP3 is 5,000 gal. per hour; guaranteed suction lift, 28 ft.; and total head, 50 ft., including friction. Supplied with 3 in. fittings, the 20DP3 can be adapted for use with 2 in. hose.

For more information circle 150 on Service Coupon Page 16 and mail now.

Single Pass Mobile Crushing Plant

A newly designed 100 to 125 yd. single pass, mobile crushing plant has been introduced by Eagle Crusher Co., Galion, O. The pilot plant is owned by Harry Miller Excavating Co., Suffield, O. (near Akron), who is processing mine run gravel for super highway nearby. Key unit is the Eagle 18 x 36 roller bearing jaw crusher, plainly visible in center of illustration. Power source for 60 hp. motor is mobile generator set.

Dragline empties into hopper from which 3 in. x 36 ft. feed conveyor (swings in 150° arc) discharge onto scalper screen. Both feed and discharge conveyors are powered independently of crusher for more flexible operation. Push-button control panel and platform are on far side of base frame assembly.

The 10 ton jaw crusher has one piece electrically welded frame. Jaws can be adjusted to turn out 1 in. to 5 in. material. Both stationary and movable jaws are reversible for extra wear.



New Eagle Crushing Plant on Highway Job

For more information circle 151 on Service Coupon Page 16 and mail now.

Street Sweeper Carries 4 Cu. Yd. Load

Production has been started by Wayne Manufacturing Co., Pomona, Calif., on a street sweeper that will pick up and carry to a central dump more than 4 cu. yd. of dirt and litter. This new Wayne Model 550 is the "big brother" to the Wayne Model 450, which has a 3 cu. yd. capacity and will continue to be produced.

The new Wayne Model 550 offers as standard equipment, at no extra cost, power steering, power brakes, pickup broom adjustment from inside the operator's cab to compensate for wear or sweeping conditions, Fibreglas cab with safety-glass roll up windows.

Proved features of the 450 which are incorporated in the new 550 include gutter broom ahead of front wheels to make possible full vision of both traffic conditions and sweeping operation, and floating action brooms which automatically raise or lower to sweep in depres-



Wayne Model 550 Sweeper

sions such as indented drains or over high places with equal efficiency.

For more information circle 152 on Service Coupon Page 16 and mail now.

Hopto Digger Has New Features

New design and engineering features on the "360" full swing Hopto Digger have been announced by the Badger Machine Co., Winona, Minn. Relocation of the two 5 in. hoist cylinders has given added power to the "360," as well as improving the over-all appearance of



Hopto Digger

this completely hydraulic $\frac{1}{2}$ yd. machine. A redesigned, streamlined cab assures the operator better visibility for every digging and hoisting operation. In addition, a greater variety of power units is available as standard equipment. The ground reach of the "360" Hopto has been extended to 26 ft., the digging depth remains at 17 ft. Both $\frac{1}{2}$ yd. and $\frac{3}{4}$ yd. capacity backhoe and shovel buckets are available.

For more information circle 153 on Service Coupon Page 16 and mail now.

Stop Sign of Porcelain — Aluminum

A new red stop sign, made of porcelain enamelled aluminum for greater durability and better daytime visibility; and Stimsonite reflectors for maximum nighttime visibility, has been introduced by the A'C'A division, Elastic Stop Nut Corporation of America, Elizabeth, N.J. With both the panel and Stimsonite reflectors impervious to weather, the new "Lifetime" sign is stated to be maintenance-free and to retain the bright legibility of its warning message indefinitely.

Resisting fracture under even severe bangs and impact, the Lifetime sign is stated to be scratchproof, rust-proof and fade-proof. It will require no repainting or treatment with reflective material.

For more information circle 154 on Service Coupon Page 16 and mail now.

Job Supervision

(Continued from page 147)

thing possible to provide the job with materials from reasonable sources.

"I would upgrade the job of resident engineer until it was considered the most important job in the highway department, making it comparable in responsibility and judgment to the superintendent which the contractor puts in the field.

"Finally, I would do all I could to make it easy for the contractor to do his job, knowing that doing so would save the state money and give the people who pay the bill more for their money."

Among the numerous speakers on the AHONAS program, none completely recapitulated the state highway officials' looming problems as Bertram D. Tallamy, chairman of the New York State Thruway Authority. Here are some of the questions he posed:

- "How will our state highway departments stretch their existing engineering forces?"
- "How can we attract new engineering talent to highway work in competition with wealthier industries?"
- "How can we bring about adequate compensation for these valuable men?"
- "Will the steel industry hold up its end or will we continue to have to wait 18 months for deliveries?"
- "Will cement keep pace?"
- "Do our contracting organizations have the equipment they need?"
- "How long will it take us to locate the new limited-access highways involved in the National Interstate System?"
- "How long will it take us to get the right of way?"

"These are problems you are going to be confronted with — and right quick!" Mr. Tallamy said. "After Congress has made its decision and the American people start paying increased taxes for the roads they want, you are not going to be able to lie back and take years to do the job.

- Installing "radiators" for snow melting at one of the plazas of the Indiana Toll Road in Hammond, Indiana.

ARBA Leaders testify on Pending Road Bill



● Before testifying before the Committee on Public Works of the House of Representatives on March 1, 1956, five witnesses for the American Road Builders' Association lined up for a photo with Congressman George H. Fallon (D.-Md.) chairman of the Subcommittee on Roads and author of the Federal Highway Bill. The ARBA spokesman presented a series of "Task Force" reports citing the capacity and readiness of the highway industry to carry out the expanding road-building program. S. Howard Brown, partner, Brown, Davis and White, Grantville, Pa., chairman, Task Force No. 3, Con-

struction; Hal G. Sours, consulting engineer, Columbus, Ohio, chairman, Task Force No. 1, Planning and Design; J. N. Robertson, director of highways of the District of Columbia and president of ARBA; Congressman Fallon; Julien R. Steelman, president, The Koehring Company, Milwaukee, Wis., vice chairman, Task Force No. 4, Construction Machinery and Equipment; and A. T. Goldbeck, engineering director, National Crushed Stone Association, Washington, D. C., chairman of Task Force No. 2, Materials and Supplies.

Melting snow and ice in Indiana

The Indiana Toll Road will be the first to use snow-melting and de-icing installations at all stop-start and pay areas. Snow-melting facilities will be installed in all twelve plazas along the route.

Pipe coils buried in all pavement lanes will be heated by boilers located under the plazas. The plan is to keep pavement surface temperature above freezing at all times.

The snow-melting units will be automatically controlled from October

15 to March 15. The 200-ft. long lanes will be entirely free of ice and snow and practically dry at all times because the excess moisture on the pavement will tend to vaporize.

The installation for the western terminal at 121st and Calumet Avenue in Hammond, Ind., is being fabricated and installed by Petroleum Piping Contractors. The Gary Plumbing and Heating Company, 3955 Harrison Street, Gary, Ind., is fabricating and installing the others.

All piping material for system was supplied by National Tube Division of United States Steel Corporation.



100% Self-Contained POWER TOOLS by **SYNTRON**

the leader in Self-Contained Equipment

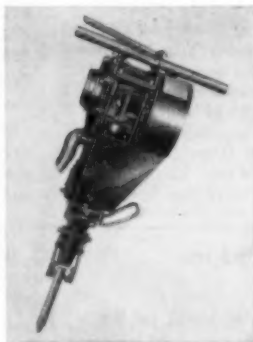


Gasoline Hammer ROCK DRILL

High speed drilling up to 2 ft. per minute. Automatic rotation of drill steels. Cleans holes to depths of 13 ft. One man operation, 100% self-contained—no auxiliary equipment.

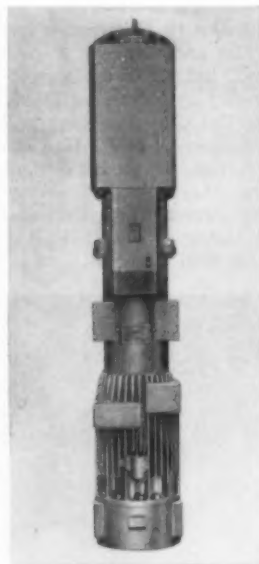
Gasoline Hammer PAVING BREAKER

Rugged, economical, 100% self-contained unit. No air compressor needed. Easily portable for one man operation. 2,000 powerful blows per minute, governor controlled—no air compressor.



DIESEL PILE HAMMER

100% self-contained—no auxiliary power needed. Syntron Diesel Pile Hammers are heavy-duty, ruggedly constructed for driving concrete, steel or wood piling under almost any conditions—backed by a proven record for ability and dependability in this field. Quick conversion of crane to mobile pile driving rig. Made in 3 sizes with capacities of 5,000, 12,000 and 20,000 foot pounds per blow.



All Syntron self-contained power tools are known for their efficiency, dependability, low operating cost plus an exceptionally long life with practically no maintenance.

SYNTRON COMPANY
384 Lexington Ave. Homer City, Penna.

Hot Oil System for Asphalt Plants

New electrically heated fully automatic Merrill process systems, announced by Parks-Cramer Co., Fitchburg, Mass., produce any oil temperature within the range of 150 to 600°F. at low pressure in a compact, completely assembled packaged unit. It is ready for immediate service when connected to the tanks or kettles to be heated and the proper electrical connections made.

In most cases only minor alterations of existing plant process vessels are needed for high temperature oil heating. There is no necessity for stay-bolting jackets or installing heavy pipe coils as the maximum pressures developed rarely exceed 15 lb.

The systems can be made explosion proof and are very well suited for the heating of individual tanks or kettles. The units may also be used as central station systems so that a number of tanks or kettles may be heated at one time, even though they require different temperatures. Proper valving and controls provide any type of operation within close limits.

For more information circle 124 on Service Coupon Page 16 and mail now.

Compression Apparatus for Testing Soils

A new type hand operated unconfined compression apparatus that can be used in making field or laboratory tests of soils, has been developed by Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill. The new piece of equipment is compact, portable and easy to operate. The machine was specifically developed to meet the requirements of practicing engineers and contractors as well as laboratory investigators in the field of Soil Mechanics.

Working on a mechanical screw principle, the operation of the apparatus is thoroughly simplified. Loading of the specimen is accomplished by turning the operating handle at any desired rate.

In this manner, the investigator can adjust his loading either to conform to the uniform rate of strain or the uniform rate of loading requirements. With a maximum platen clearance of 8 in., the new tester is not limited strictly to the field of engineering soil testing, but can also be used for testing other materials. The apparatus weighs only 30 lb.



Soiltest Compression Testing Apparatus

For more information circle 125 on Service Coupon Page 16 and mail now.

HARRIS HOTEL IN NEW YORK HOTEL KNICKERBOCKER

In the heart of TIMES SQUARE
at 45th Street near BROADWAY
Radio City, Fifth Avenue and the
Great White Way at Your Door.

400 fine rooms with both and radio \$4 from

• AIR-CONDITIONED ROOMS
• TELEVISION AVAILABLE Tel. JUdson 2-4200

OTHER HARRIS HOTELS IN
ST. LOUIS CINCINNATI
HOTEL DE SOTO HOTEL METROPOLE
COLUMBUS, O. DETROIT
HOTEL BROAD-LINCOLN HOTEL FORT WAYNE



... for more details circle 260, page 16

Caterpillar announces a **TURBOCHARGED**

D397

(SERIES D)

650 HP

Maximum @ 1300 RPM

AND

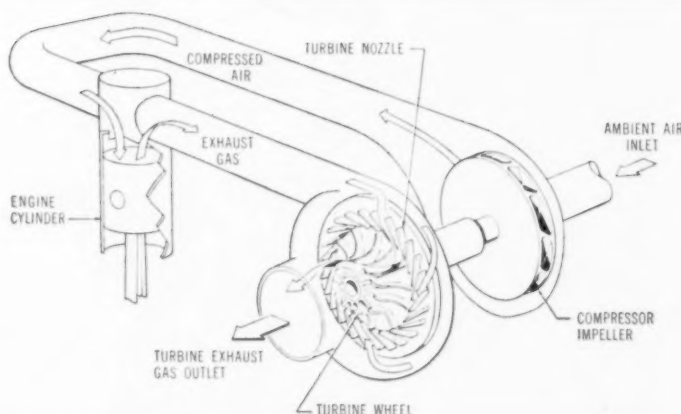
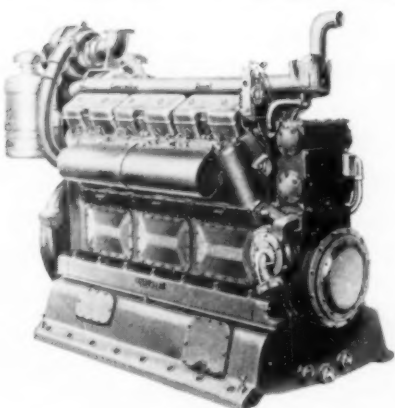
D375

(SERIES D)

430 HP

Maximum @ 1300 RPM

**Compact, modern heavy-duty diesels for
greater power, efficiency and economy!**



The Cat D397 Turbocharged Engine

Both the D397 and the D375 are also available as roots blown, naturally aspirated or spark ignited engines.

The Turbocharger . . . Exhaust Gas and Air Flow

Another example of Caterpillar leadership in action! The Turbo-

charger, driven by the engine exhaust, utilizes energy which would otherwise be lost. It packs air into the engine according to engine load for greater efficiency.

As shown in the diagram above, engine exhaust gases turn the turbine, which drives the compressor . . . the compressed air then enters the cylinders. Final result: more power on less fuel.

More than eighteen years of research have gone into these two new CAT* Turbocharged Diesels. Incorporating metallurgical, mechanical and aerodynamic advances, they are engineered to deliver higher horsepowers and lower operating costs at reduced noise levels. Their advance-design features are also available in D397 and D375 Electric Sets and Marine Engines.

With these engines in the Caterpillar line-up, you now have an even wider choice of

compact, modern heavy-duty power to meet your requirements. Get the complete facts about these two new Turbocharged Diesels from your Caterpillar Dealer!

Caterpillar Tractor Co., Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**MODERN
HEAVY-DUTY DIESELS**

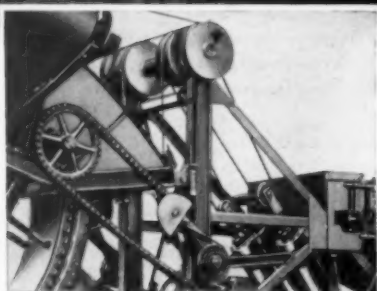
NOW!

Instant Hydraulic Control of Conveyor Speed and Direction

Only

**Gar Wood
Buckeye**

has it!



LIVE HYDRAULIC WHEEL HOIST, TOO!

Positions digging wheel faster, more accurately. Independent of all other operations. Operated from the seat by simple, one-hand controls.

Live hydraulics in new job-proved Buckeye ditchers make conveyor control far easier and faster than ever before. From the seat, the operator merely touches a lever for instant conveyor adjustment to handle any volume of spoil. Three discharge speeds in either direction meet every conveyor need. And, Gar Wood's exclusive hydraulic conveyor drive is completely independent of any other function. No complicated shifting . . . no need to stop digging wheel or crawlers. Maintenance is easier, too. No complicated drive transmission to adjust and repair.

All three of these new Gar Wood-Buckeye models—the 305, 307 and 308—have this and many other important features. For complete data and specifications, call your Gar Wood-Buckeye dealer or write direct to: Customer Service Department, Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Findlay, Ohio

Plants in Wayne and Ypsilanti, Mich.; Findlay, Ohio; Mattoon, Ill.; Richmond, Calif.



Gar Wood
Excavators



Gar Wood
Tractor Equipment



Gar Wood
Winches



Gar Wood-Buckeye
Finegraders



Gar Wood-Buckeye
Ditchers



Gar Wood-St. Paul
Hoists & Bodies

Bituminous **ROADS AND STREETS**



● Constructing new relocated, exit ramp paving at an interchange of the New Jersey Turnpike, as part of the \$24 million widening project of 1955. (Roads and Streets Staff photo.)

Published by Gillette Publishing Company
22 West Maple Street, Chicago 10, Illinois

Paving Methods In Widening New Jersey Turnpike
Liquefied Petroleum Gas Fires Drier



BEFORE: Condition of pavement on Broad Street prior to treatment.



AFTER: Treated pavement after being open to traffic for one month.

A Tough Job: **Seal main street without traffic tie-up**

Here's how it was done with BITUMULS® in Richmond, Virginia

BROAD STREET, the main artery in Richmond, Virginia, carries the combined truck and automobile traffic of Routes 1, 301, 250 and 33.

Under a load of more than 40,000 vehicles per day, sections of the existing pavement were raveling at an alarming rate. Full width plant-mix resurfacing would have put the surface too high on the curb line. Digging out the old pavement would prove too costly.

The problem was reduced to this: *seal the street without traffic tie-up, and without bleeding, flying stone, or other inconveniences to the public.*

Based on many years' experience with Bitumuls, the City Maintenance Forces, headed by H. F. Phillips, Chief, and Dick Kelley, Superintendent, worked out their problem with E. P. Asbury, of the City Construction Department.

The job was put in the hands of W. M. Allnutt, Chief, Construction

Division, and Col. A. P. Fulton. Cutting and patch work was let under contract to a local firm, with traffic carried through and around the work.

Sealing was done by the City Maintenance Crew in the following manner:

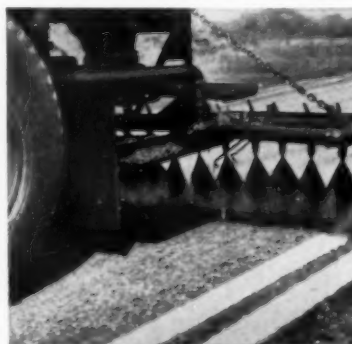
Early on Sunday, between 6:00 a. m. and 11:00 a. m., 9,000 gallons of Bitumuls (quick-setting emulsified

asphalt) was applied on the south side of the street at the rate of 0.3 gal. per sq. yd. This was covered by 15 lbs. per sq. yd. of No. 7 Maryland slag.

Traffic was diverted to the north side of the street, but the south side was opened to traffic at 1:00 p. m. The north side of the street was done in a similar manner early on a week-day morning of the following week.

The results: excellent! Along the entire 1.57 miles of 72.4 ft. roadway there was no softening or bleeding of the fresh seal. No pick-up was experienced, even at open intersections. All work was broomed clean and watered, if necessary, the following day to eliminate dust. Costs were remarkably low.

This is just one of the ways in which Bitumuls has helped to solve pavement problems for cities and towns throughout the country. *When you have a "tough job," contact our nearest office.*



Controlled application of Bitumuls asphalt emulsion was followed by the placement of cover aggregate. The surface was then rolled.



Leading Marketers of Asphalts, Cutbacks, and Bitumuls — Nationwide.

American Bitumuls & Asphalt Company

200 BUSH STREET, SAN FRANCISCO 20, CALIFORNIA • Perth Amboy, N.J. • Baltimore 3, Md.
Cincinnati 38, Ohio • Mobile, Ala. • Tucson, Ariz. • St. Louis 17, Mo. • Portland 7, Ore.
Inglewood, Calif. • Oakland 1, Calif. • San Juan 23, P.R.

... for more details circle 180, page 16

ROADS AND STREETS, April, 1956



Two of the thousands of Barber-Greene Tamping-Leveling Asphalt Finishers which set the standard for quality, speed and economy in asphalt paving.

Jobs don't have to be selected for the Barber-Greene Finisher

The Barber-Greene Finisher is not limited in the types of jobs it can handle. It takes them all in stride. Here's why:

Top Paving Speed: The Barber-Greene will lay any mix at operating speeds as fast as any paving machine now in use. Speeds have only been restricted by surface quality standards. Competitive claims to the contrary, experience has shown that the Barber-Greene will lay as fast with the same surface quality.

Positive Traction: A finisher must maintain traction and steering control while pushing loaded trucks up steep grades, on slippery primes, on soft bases. Barber-Greene's crawler mounting assures this positive control.

Superior Maneuverability: Short over-all length and crawler mounting save valuable time in fast maneuvering or turning around, even in narrow streets or confined areas.

Ease of Control: The operator has an unrestricted view of truck dumping, material level at spreading screws, and finished mat.

Time-Saving Hopper: The receiving hopper is amply wide for fast truck changes and easy discharge, without spillage. It automatically feeds the spreading screws. No hand shoveling required.

World-Wide Parts and Service: Barber-Greene parts and service are available from local stocks on short notice, all over the free world.

See how this preferred finisher will cut your costs. Write for literature.

56-6-F

Barber-Greene

AURORA, ILLINOIS, U.S.A.



CONVEYORS...LOADERS...DITCHERS...ASPALT PAVING EQUIPMENT

... for more details circle 185, page 16

ROADS AND STREETS, April, 1956

159

Often Copied but Never Matched

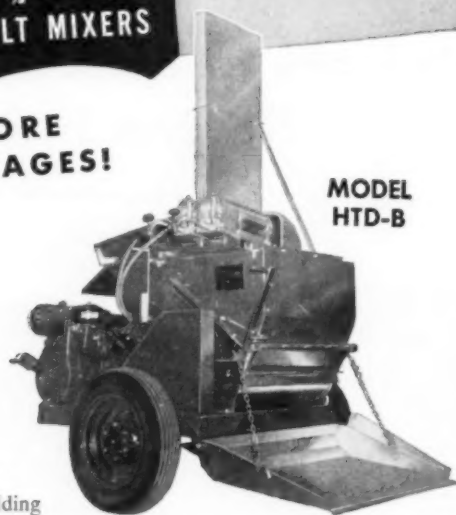


Leaders for many years, McConnaughay Asphalt Mixers have many outstanding features which are often copied... "but the complete machine has never been matched for versatility and all-around performance," said a long-time user. No other mixers can do so many things so well. Details and specifications (available on request) will show you why.

**MODEL
HTD-500**

McConnaughay
MULTI-PUG ASPHALT MIXERS

**OFFER MORE
ADVANTAGES!**



**MODEL
HTD-B**

McConnaughay Mixers are the result of more than 25 years' active experience in building mixing equipment and in all phases of the paving industry. Extensive laboratory and field testing assure buyers that these mixers will do the job in practice as well as in theory. Hundreds of the two mixers illustrated are in active service in 46 States, Alaska, Canada, South America, Europe and Africa. Designed for fast, economical operation in any climate in any season... they do the job wherever located. That's why customers are our best salesmen. Write for name of user nearest you.

ASPHALT EQUIPMENT CO., INC.

3929 Buell Drive, Fort Wayne, Indiana

National distributors for K. E. McConnaughay, Lafayette, Ind.

... for more details circle 237, page 16

Adhesion tests play an important role in this department's procedures, which have helped prolong the life of a large mileage of older road surfaces.

By A. B. Cornthwaite

Testing Engineer, Virginia Department of Highways, Richmond

How Virginia

THE Virginia department of highways has made extensive use of seal-coating work in recent years. By this means we have been able to delay extensive resurfacing or rebuilding of bituminous roads for as much as two to five years without particular damage to the pavement structure. What this has meant in dollar savings is difficult to estimate, but certainly it has been considerable and other roads have been benefited by our being able to apply heavier maintenance or construction on roads having more need of improvement.

Our specifications provide for the conditioning and preparation of the base before the seal coat is applied. This will include strengthening any weak or broken areas and correcting isolated slick or fat spots. Immediately prior to the application of bituminous material the surface and a strip six inches wide on each side is swept or cleaned with a power broom or blower.

Bituminous materials used are not markedly different from those normally used in other areas. We do require them to meet an adhesion test (either our Type I or Type II Adhesion Test) in addition to the regularly specified constants for viscosity, distillation, etc. The need for bituminous material to perform satisfactorily — to have adequate adhesion to any type of aggregate — has long been recognized in

Virginia and resulted in the development of these two adhesion tests.

At the present time only asphaltic materials are being used for seal treatments due to economic conditions. Tars are acceptable materials, but must compete price-wise to be used. Circumstances of locations, production costs, etc., make asphalt the more economical material at the present time. Grades and types used are RC-2, RC-3, MC-2, MC-3, AP-00, and AEM-2. The latter material, AEM-2, is similar to RC-2, but is an inverted emulsion product with 3 to 8 percent water. It is required to have curing properties the same as our rapid curing bituminous materials.

Aggregates must meet requirements for Grade B stone, gravel and for sand. Aside from cleanliness, durability and weather resistance properties, they must have a Los Angeles abrasion loss of less than 43 percent.



● Application of cover aggregate on bituminous seal coat by means of mechanical chip spreader. Virginia department of highways.

Controls Sealing Quality

The condition of the existing road surfaces determines the quantity of bituminous material used, but the rate is specified to be between 0.15 to 0.25 gal. per sq. yd. This range is adequate for most conditions. Aggregates will have a nominal maximum size of $\frac{1}{2}$ in. and are applied at a rate of from 10 to 25 lb. per sq. yd.

In order to avoid as much as possible the obtaining of unsuccessful seal treatments there are weather or seasonal limitations specified. No bituminous material is to be applied between November 1 and April 1. At other times application is permitted when the temperature is above 50° F. and the weather is not foggy and damp or otherwise unsuitable. However, there are always emergency conditions arising, as well as the need for winter time improvements. To take care of these unusual cases bituminous material which meets our Adhesion Test, Type II is specified to be used.

Rollers Required

Rollers are required to be self-propelled units weighing from 7 to 10 tons and weight distribution of not less than 100 lb. nor more than 300 lb. per linear inch width of tread. Provision for scrapers or water application on the rollers must be made to prevent adhesion of the bituminous material to the rollers.

Pneumatic tired rollers are permitted to be used provided the weight and design provide the necessary compaction.

A word of explanation about our Adhesion Tests may be helpful. The Type I test was the first developed. It utilizes cutback asphalt and high penetration (200 plus) asphalt cements with a dolomite aggregate.

Chosen for Two Reasons

This particular aggregate was chosen for two reasons. First, it is a white aggregate and permits of easy evaluation of stripping test results; and, secondly, our actual field experience with aggregates in Virginia has shown this aggregate to be about average in stripping characteristics. Being a dolomite it is classed as an hydrophobic or basic type rock, but actually it is not a "good" performer.

The aggregate used for the Type II Adhesion Test is an hydrophylic aggregate — a silicious gravel which represents the acid type rocks. Only liquid bituminous materials are required to meet this test. In this test the gravel is first wetted with water so the bituminous material must not only coat a wet, silicious aggregate, but must retain 95 percent of that coating in the 18 hour static immersion period.

Application of the bitumen receives attention by requiring that the dis-

tributors be in good working condition to avoid both longitudinal and transverse streaking. This is of great importance to prevent bleeding or loss of the cover aggregate.

The success of the treatment lies not only in the materials specified and used, but also in the pre-examination of the pavement to determine its exact condition, and in modifying rates of application as conditions warrant. After the treatment has been made, then it is felt that traffic must be controlled to prevent damage. The best procedure we have found is to use a pilot truck which controls both the speed and location of the traffic over the newly completed seal treatment.

These new treatments which are caught in a rain are given special control. In the event it appears there is danger of losing the treatment, traffic movement is severely controlled and may even be stopped in order to prevent complete loss.

Our latest standard specifications dated April 1, 1954, includes Section 200 covering "Materials" with Section 204 for Fine Aggregate, Section 206 for Coarse Aggregate, and Section 231 for Bituminous Materials. Construction details are given in Section 300 with Section 320 for Bituminous Surface Treatments. Special provisions for bituminous surface treatments formed a part of our contract maintenance operations for the year 1955.

(Continued on page 170)

See page 170 for Virginia specifications and tests covering adhesion.

Paving Methods in Widening the

Exacting specifications and thorough advance planning helped solve problems of paving new lanes in midst of heavy, high-speed traffic. Special attention given to matching elevation of existing pavement and securing a good joint.

ONE of the 1955 year's largest and fastest paving projects, and certainly the most unusual, was that involved in widening the New Jersey Turnpike. Over a million square yards of new heavy-duty asphaltic pavement was required in adding a third

lane on both dual roadways along 61.5 miles of its length.

As outlined in *ROADS AND STREETS* staff preview of this \$26 million rush job,* the turnpike's officials, foreseeing continued traffic growth, decided to execute an unprecedented third-

- Typical sight in late summer along the New Jersey Turnpike. Barrier curb in place. Base for widening under construction, along with shoulder work. Back-slopes graded but not dressed or topsoiled.



laning job in a single season. A 22-mile section south from Lincoln Tunnel interchange opposite Manhattan, to a point south of Woodbridge, was originally built as a 6-lane road with one short dual dual-lane section. By converting from 4 to 6 lanes over the 5.4-mile section north from Lincoln Tunnel to the northern terminus, and similarly widening the 56 miles on south from Woodbridge to the Camden interchange near Philadelphia, the turnpike could be made to provide 6-lane service continuous for the northern (and busiest) 88.3 miles of its 118 mile total length.

The project in addition to the paving here described entailed 3,000,000 cu. yd. of excavation to widen cuts and embankments, 350,000 lin. ft. of drains, lengthening of hundreds of culverts, widening 34 bridges, rebuilding shoulders, setting back guardrail — all done under an exacting set of requirements designed to protect the safety of turnpike patrons and construction workers.

Traffic protection was a major consideration as detailed in the aforementioned pre-season report. A major item in contractor cost for this protection was the requirement of 8x12 timber barrier curbs along the outer pavement edge at prescribed stages. Over 125,000 lin. ft. of such curbs was in use at the late-summer peak of operations, requiring such great footages of heavy timbers that an acute shortage of this commodity was felt in the New York City area.

The widening was performed under four contracts awarded early in the year, as shown in Table I (page 180).

The pavement design and construction closely followed the details adopted for the original turnpike paving. It will be recalled by many readers that this pavement, which represented many innovations, consists of a heavy granular subbase, asphalt penetration macadam base, and three-course asphaltic concrete top totaling 18½ in. thickness above template grade.

Overlay Work. Prior to beginning of widening and required to be done by

* "World's Biggest Widening Job — Jersey Turnpike Being Let Out at Seams;" *ROADS AND STREETS*, June, 1955.

New Jersey Turnpike

- Spreading granular borrow with Cat D8 dozer on Savin's W-4 job.



- On Reid's W-3 contract: Jackson shoe-type vibrator consolidating base for new lane, Galion grader on shoulder. Paving subbed by Kingston Bituminous Products Co.



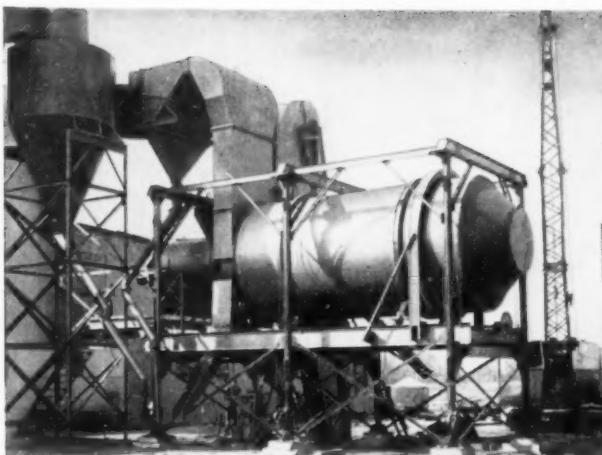
- (Left): Material being placed in new shoulder strip by Autocar truck with 20-ton Heil dump body. Typical operation which required much backing-in and other maneuvering of trucks. Traffic cones specified when thus working outside shoulder. (Right): Consolidating subgrade under new shoulder area on Union's W-5 project.

mid-summer, localized resurfacing was completed to restore any settled or uneven areas of the existing turnpike pavement to satisfactory profile. This trueing up was deemed necessary, among other reasons, to furnish an accurate template for the new adjacent lane. Special care was required to matching new pavement elevation with old.

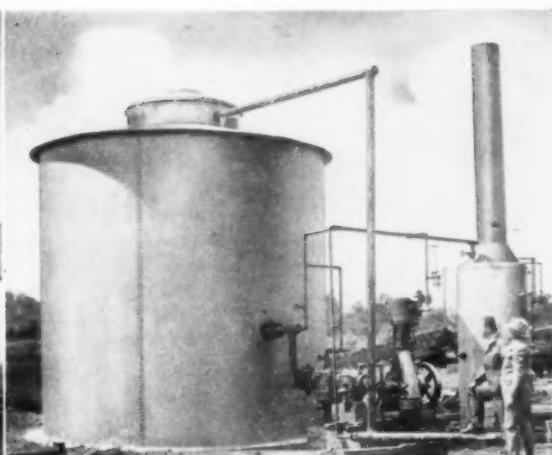
Subgrade. Specifications read that the subgrade be prepared in three stages following or during completion of the necessary grading: (1) grade and complete subgrade under new shoulder area; (2) remove existing shoulder material (bituminous penetration) to 10 in. depth, place it on the new shoulder area or stockpile as contractor elects, without permitting

intermixing of this material with material excavated for the new paving lane; and (3) complete subgrade for the new paving lane, again avoiding intermixing of excavated material with old shoulder metal.

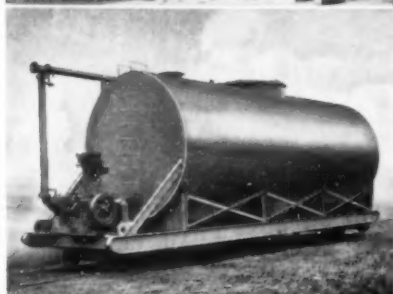
The subgrade was required to be compacted to 95% of the turnpike modification of the AASHTO test method T-99-49, and pretested by two



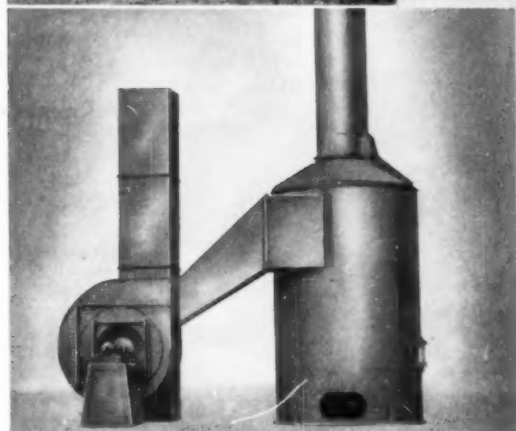
SIMPLICITY DOUBLE SHELL DRYER
will increase production on any make of plant and pay for itself in fuel savings alone.



SIMPLICITY VERTICAL TANK
(with "Hot Well"). Keeps only enough asphalt heated to required temperature to supply the plant. The "inner well" is insulated by the asphalt at lower temperature in the "outer tank."



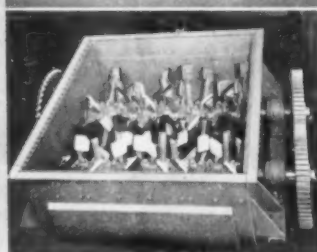
SIMPLICITY HORIZONTAL TANK
(with "Hot Well"). This new Simplicity development follows the long established "inner well" principle in a horizontal tank.



SIMPLICITY FEEDER BIN
for accurate feeding of coarse and fine aggregates. Two to four compartments.



SIMPLICITY AIRWASHER
designed primarily for asphalt plants. Inexpensive but highly efficient in eliminating smoke and dust nuisance.



SIMPLICITY PUG MILL MIXER
with Simplicity's exclusive double-zone mixing action.

SIMPLICITY STANDARD UNITS
have improved the efficiency of other makes of asphalt plants. These improvements frequently pay for themselves on one job. Engineering recommendations on request with no sales annoyance.

THE SIMPLICITY SYSTEM

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BETWEEN MEN WHO KNOW**

DEPENDABLE
THE SIMPLICITY SYSTEM COMPANY

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... for more details circle 276, page 16

ROADS AND STREETS, April, 1956

GET ON THE ROAD TO HIGHER PROFITS WITH GALION DUO-SCOPIC HOISTS

haul more...earn more...with every load



Model 66381 outrigger mounted Duo-scop hoist with Model 12N-5 body. Hoist capacity up to 22 tons.

Start earning extra profits
with Duo-scops right away. Phone or see
your Galion distributor today.

Galion Duo-scop hoists, mounted on trucks with high-capacity front axles, offer a solution to the problem of profitable operation under conditions imposed by today's axle weight limit laws.

Duo-scops are engineered to eliminate unnecessary dead weight and to relocate a greater portion of hoist, body and load weight forward off the rear axles. Teamed with Galion's weight-saving contractor's bodies, they can carry as much as 1,500 lbs. more payload than conventional hoists and bodies.

And, every Galion Allsteel hoist is twice-tested before shipment to protect you against costly down-time.

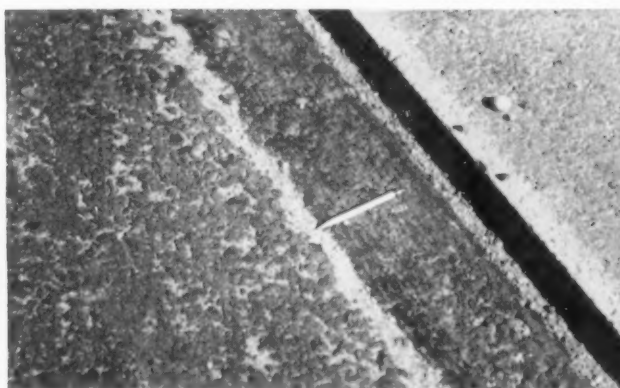
AA-834

THE



GALION

ALLSTEEL BODY COMPANY • GALION, OHIO



- (Left): Chipping tool set in scarifier frame of motor grader, used to cut away 1½ in. depth of asphalt behind saw cut. (Right): The resultant exposed sawed edge. Existing binder course seen beneath pencil, with binder course for new lane in place alongside.

Paving Methods

(Continued from page 164)

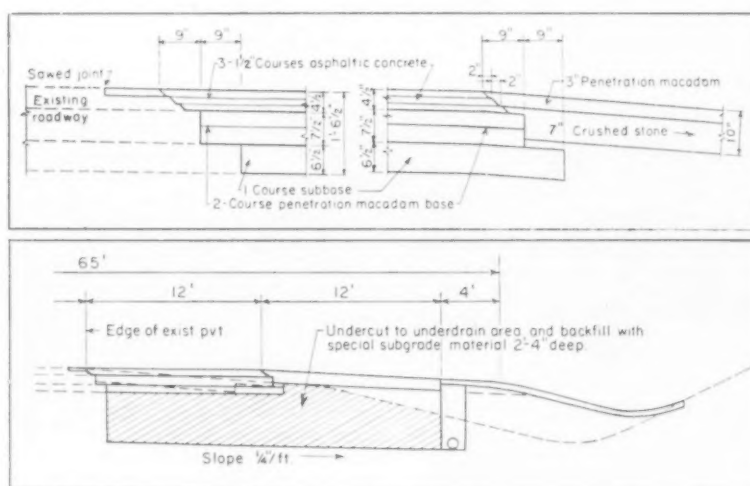
The minus 200 material was limited to not exceed 2/3 of the weight of material passing the No. 40. And the minus 40 fraction had to have a PI not exceeding 6 and liquid limit not over 28.

The contractors were given a choice of blending his material during the crushing, or on the grade. In general they chose the latter method. S. J. Groves on contract W-2 used a Jersey spreader with Cat D8 tractor for initial spread, and two Seaman Pulvimixers for blending. Reid on contract W-3 used a small P & H stabilizer to blend granular borrow with crushed stone. Other contractors blended the material with a motor grader.

Rolling to 95 per cent of standard density at optimum moisture was done with any combination of rollers the contractors preferred. Tolerance of finished subbase, ½ in. in 10 ft.

Macadam Base. The base course totaling 7½ in. thickness was placed in two layers using 2½ in. maximum

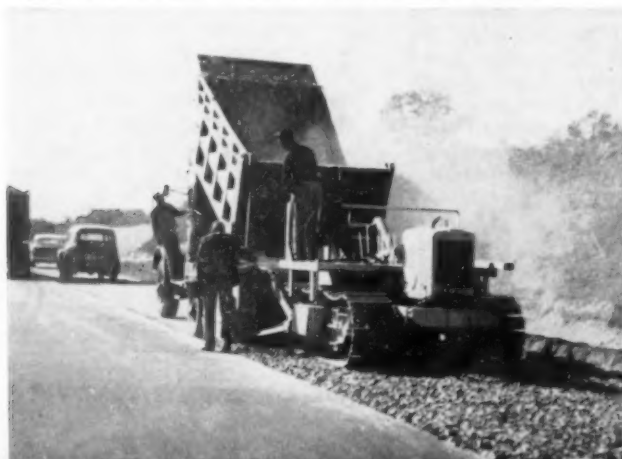
- A typical undercut section of the New Jersey widening job.



- Details of the sawed joint and of the pavement and outside shoulder for the roadway pavement.

stone graded as follows:		1½ in.	35-75
Sq. Sieve Opening	Total % Passing (by weight)	1 in.	10-20
		¾ in.	0-5
2½ in.	100	No. 200	0-2
2 in.	85-95	(Continued on page 180)	

- Blaw-Knox spreader on Savin section, laying stone for new shoulder, and Bros rubber-tired consolidation in progress on shoulder at another location on Reid contract.



VIEWS AND COMMENTS

By H. G. Nevitt

THE SPOT TEST

THE search for quality tests for asphalt has been as unremitting as it has so far been disappointing. When a number of years ago the spot test was announced as a means of detecting asphalts which had been overheated in processing, with preliminary evidence seeming to confirm this, it was accepted with enthusiasm. In a relatively brief period (despite protests from technologists familiar with all phases of the petroleum industry rather than asphalt alone) it practically swept the country and was incorporated in a great number of specifications. There were however, notable exceptions, with great credit to the agencies concerned. In the many years since that time a considerable knowledge about the test has accumulated; it appears time to take stock on this requirement.

The technical facts have become clean. A positive spot has not been proven to be in itself any sign of an inferior asphalt or that it has been overheated. Asphalts showing negative spots have often been found to come from crudes which showed positive; and asphalts from certain crudes, reduced by laboratory means which precluded overheating, have been found to be positive. To add to this confusion it has recently been shown that positive spot asphalts can be modified by blending with other fractions from the same source to show negative. No clean correlation between spot and performance has been demonstrated nor is there any accepted theory from which to conclude such should be the case. The spot test has been described as a test for homogeneity, but this characteristic is being observed only for the solution of the asphalt in the test solvent, not for the asphalt itself: in solutions of other solvents an Oliensis negative asphalt might show positive, an Oliensis positive give no spot.

In brief, a positive spot in itself

cannot clearly be a sign of an injured asphalt; nor, conversely, can it be counted on that an injured or undesirable asphalt will show a positive spot. If there is to be technical reason or logic in our specifications, the requirement should be deleted.

The practical facts are equally clear but less widely known. There has never been any showing that the processing effects which converted a negative asphalt to a positive one has any relation to road performance. It is true the so-called cracked asphalts have had a varied history. Some have done outstandingly well; others have made a poor showing. However, a good reason for this latter situation should be clear to everyone in the light of our increased knowledge of the effects of volatility. Almost invariably such asphalts, unless specially refined subsequent to the cracking operation, show a high volatility loss and reduction in penetration. Practically every failure associated with a positive spot can be accounted for by this reason alone; and this volatility is a coincidence, rather than a necessary consequence of this method of manufacture.

Make Good Showings

Positive spot asphalts which were properly refined and properly used have made a good showing. There are excellent pavements today built almost two decades ago with such products. Another obvious reason for recognition that the spot is not the critical factor in this situation is the preference by industrial users of such asphalts where high adhesion and cohesion are required. Apparently commercial buyers have been more realistic in correlating cause and effect than the highway agencies in this matter of a spot requirement; it is practically non-existent in their specifications.

The highway purchasers may claim lack of concern about the requirement because they have so far had ample offerings despite it. The manufacturers of good positive spot materials have been equally complacent for two reasons. One is that the availability of positive spot asphalts from cracking is rapidly disappearing; the other that materials of this type now made can find the less seasonal markets noted above for commercial utilizations. However, it is our feeling that this defense of the specification represents fallacious reasoning. Hence failure to act based on it is not merely unsound, but also harmful. The spot requirement will cause trouble and extra expense to refiners even if all cracking processes which make such materials disappear and only modern asphalt equipment (which produces no positive spot asphalts from crudes which do not show them in proper laboratory processing, though despite this it might injure the material if improperly operated) is utilized.

Crude Segregation

At the present time crude segregation to eliminate naturally positive asphalts is being practiced; crude supplies for asphalt operations are limited by the volume of such materials; and many other similar steps are being taken by refiners. Since refiners have become organized to do this and it perhaps limits the entry of new competitors in the field, not many protests are heard. Nevertheless, these things do involve extra expense.

We take it for granted that highway administrators are well aware such costs are invariably passed on in the price of the product, even though the mechanism by which this may occur is indirect. In fact, every specification requirement that limits supplies adds to the cost; they are only justified when the gain clearly outweighs the loss. Summing it all up from the practical standpoint, regardless of theoretical considerations and the tendency to blame positive spot materials for everything that goes wrong when they are used, the agency maintaining a spot test requirement has practically nothing to gain and much to lose from it.

Perhaps more important than these good reasons is the one of principle. If the practice of writing specifications which are not backed by soundness in scientific principles or in their interpretation is permitted, we can look forward to confusion indefinitely

in our specification picture. There has been too much of this in the past; action to minimize it in the future seems alone a good reason for eliminating this injudicious requirement.

To those who have been holding on to the spot test, due to their feeling that asphalt quality requirements were in the distant future, it may be commented that we seem on the threshold of developing the knowledge of what has caused so-called quality failures in the past. And with it we may gain some idea of how to assure elimination of such failures in the future. Excessive volatiles are being clearly shown to be a prime cause of trouble, although there is perhaps some tendency building up to make this the only villain on the scene. If, however, volatility failures can be brought out in the open and distinguished from those failures which are caused by chemical changes in the asphalt, practical means of controlling these latter will not be too long in appearing.

It all sums up to the statement that positive spot has too long been the bugaboo with specifications writers looking for quality requirements, with the result that their attention has been diverted from volatilization and chemical change. These can of course occur in positive spot asphalts but they can appear equally in the negative spot materials. Probably today good positive spot asphalts are being excluded and poor negative spot asphalts being accepted, when the picture would be reversed by true quality tests. We are doing the future of asphalt a dis-service by keeping in this bogus test instead of going directly to true measures of durability.

Low Initial Quality

In closing this discussion, we cannot fail to call attention to another consideration which seems to have received scant attention. This is that many negative spot asphalts don't fail through loss of quality; they simply have low quality at the start, and this is the cause for the ultimate poor performance of the mats built with them. When good positive spot asphalts, properly refined to control the volatiles, are excluded more of these poor negative materials are going to be used. The probable overall result is a net loss. What we need, and may have in the not too distant future if specifications become less arbitrary, are tests which will accept the good and eliminate the poor of both types.

The spot test is certainly not helping, possibly is hurting, the achievement of this desired end.

Obviously, asphalt technology has a long way to go but some progress will be made when we discard specifications which clearly lack merit and arbitrarily restrict the supplier without benefit to the purchaser.

It is just as much our job to reject questionable requirements as it is to put in true quality specifications as soon as we can find them.

Toll road obstacle

The proposed \$227-million Tacoma-Seattle-Everett toll road, which already has cleared one legal obstacle, faces another May 14.

The Washington State Supreme Court will review a decision by the Thurston County Superior Court. The lower court held that the project met all legal requirements. The latest court test was brought by the state and by owners of Seattle parking lots whose property would be condemned.

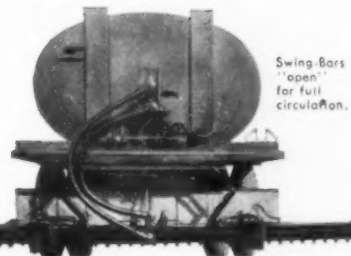
AIR-Snap SPRAY BAR SHUT-OFF

Eliminates "fat" and "lean" Spots . . .



"FULL-SIGHT" Operation

Swing-Bar Distributor
Product of
SEAMAN-GUNNISON
BARABOO, WISCONSIN



Swing-Bar
"open"
for full
circulation.

- Exclusive AIR-Snap Spray-Bar provides quick opening and closing . . . no lean spots at starting line; no dripping after shut-off. Assures positive rate of bitumin application.
- Swing-Bar moves up or down, right or left. Outer sections turn back full 180° for transport and swing back when encountering obstructions (prevents damage to equipment).
- Air-Snap Valve operates on compressed air, controlled from operator platform.
- Each 3-ft. section selectively controlled.
- 800, 1000, 1250, and 1500 gal. cap., truck-mounted tanks.
- 1500, 1750, 2000, and 3000 gal. cap., semi-trailer mounted tanks.



Also, get details on new DUO-FACTOR, a 6 to 19 ton Combination Steel and Pneumatic Roller.

SEAMAN-GUNNISON CORPORATION
BARABOO, WISCONSIN

Send full details ☐ Bituminous Distributor
☐ Duo-Factor, to:

Name.....
Address.....
City..... State.....

Virginia Department of Highways, Specifications and Method of Test for Adhesion of Bituminous Materials

(Continued from page 161)

As revised February 14, 1955

TYPE I

Specification:

Bituminous materials which under the conditions of test fail by visual estimation to retain a bituminous film on 95% of the surface area shall be rejected.

Method of Test:

I. Materials required:

(1) Standard aggregate: Shady Dolomite between $\frac{3}{8}$ in. $\frac{1}{4}$ in. sieves, washed in distilled water and air dried for at least 24 hours.

(2) Distilled water having a minimum of pH of 6.3. The proper pH shall be obtained by boiling or redistillation and not by use of an electrolyte.

(3) Miscellaneous apparatus: 600 ml. beakers, 8 oz. seamless tin boxes, oven, hot plate, spatula.

II. Classification Bituminous Mat.:

Details in test procedure vary in order to adapt the test to different classes of materials. The bituminous materials tested fall into three groups:

Group A — RC-2, RC-3, AEM-1, 2 and 3, RT-5, 6 & 7, RTCB-5 & 6.

Group B — Asp. Em. (AE-1 2 and 4.)

Group C — AP-00, AP-0, OH-1, RT-

8, 9, 10, 11 & 12.

III. Procedure for Group A:

(1) Weigh 50 grams of the standard aggregate at room temperature into an 8 oz. seamless tin box. Add 2 grams of the bituminous material under test which has been previously heated to 140°F. The two shall be thoroughly mixed with a stiff spatula until all aggregate is coated. (It may be helpful to obtain complete coverage of the aggregate to place the tin box on a hot plate for a few seconds while mixing).

(2) The coated sample in the tin box shall then be placed in a constant temperature oven at 140°F. and cured for one hour. After removing the sample from the oven it shall be remixed for about 2 minutes to insure uniform distribution of the bituminous coating.

(3) The sample shall be transferred from the tin box into a 600 ml. beaker containing about 400 ml. of distilled water and allowed to remain immersed for a period of from 15 to 18 hours at 77°F. At the end of the immersion period the sample shall be examined under water and the percentage of surface area of the aggregate remaining coated shall be determined by visual estimation.

IV. Procedure for Group B:

(1) Weigh 50 grams of aggregate into a tin box and heat to 275°F. in a constant temperature oven for $\frac{1}{2}$ hour.

Weigh 3 grams of emulsion into another tin box and drop the aggregate into it and thoroughly mix the two.

(2) The sample shall then be placed in a constant temperature oven at 140°F. and cured for 2 hours. After removing the sample from the oven it shall be remixed for about 2 min. to insure uniform distribution of the bituminous coating.

(3) From this point the immersion and evaluation are the same as for Group A as described in III, (3) above.

V. Procedure for Group C:

(1) Place about 10 grams of bituminous material under test in a tin box. Weigh 50 grams of aggregate into another box. Place both boxes in a constant temperature oven at 275°F. for one-half hour. Weigh 2 grams of the bitumen into the box of aggregate and mix thoroughly to insure uniform distribution of the bituminous coating. About 2 minutes shall be allowed for the bitumen to set up, stirring constantly during this time.

(2) No curing period is required. From this point the immersion and evaluation are the same as for Group A, III, (3).

NOTE: Samples of Shady Dolomite for test purposes may be secured from the Department at no charge.

TYPE II

Adhesion Test for Bituminous Materials, Type II, is designed to procure a bituminous material that will satisfactory coat and adhere to wet and cold aggregates being used under severe and adverse weather conditions.

The test procedure is applicable to Rapid Curing Cut-back asphalts RC-2 and RC-3; and Emulsified Asphalts, (Immiscible Types) AEM-1, AEM-2 and AEM-3; and Tar RT-6, RTCB-6, RTCB-5, and RTCB-6.

Procedure:

(1) Fifty grams of the standard reference gravel, washed in a distilled water having a minimum pH of 6.3, air-dried for a minimum of 24 hours, and graded to a size that 100% passes a $\frac{3}{8}$ in. sieve and is retained on a $\frac{1}{4}$ in. sieve, shall be weighed into an eight-ounce seamless tin box and thoroughly wetted with one gram of distilled water. The wet aggregate shall be thoroughly mixed and completely coated with three grams of the bituminous material which has been heated to 60°C. (140°F.). The mixing process shall be performed in adequate light and the bituminous material shall satisfactorily coat 95% of the surface area of the aggregate as determined by the visual estimation method. At times it may be helpful to place the tin box on a hot plate for a few seconds while mixing. The mixture shall then be placed in a constant temperature oven at 60°C. (140°F.) and cured for a period of one hour. On removal from the oven, the sample shall be remixed for about two minutes to insure a uniform coating of the aggregate.

(2) The sample shall then be transferred to a 600 cc. beaker containing 400 cc. of distilled water at a temperature of 37.8°C. $\pm 2.5^\circ\text{C}$. (100°F. $\pm 5^\circ\text{F}$.) having a minimum pH of 6.3 and allowed to remain immersed for a period of from 15 to 18 hours.

(3) At the end of the immersion period, the sample shall be observed under water and the percentage of surface area of the aggregate remaining coated shall be evaluated by visual estimation.

(4) Any bituminous material which under the conditions of the test fails to coat 95% of the surface area of the aggregate originally or to retain 95% coating of the surface area of the aggregate by visual estimation shall be rejected.

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... for more details circle 264, page 16



1. THE MADSEN MODEL 440 TWIN-SHAFT PUG MILL MIXER—with improved mixing action, faster discharge and built-in oversize capacity. . . . The only mixer with externally removable sectional liners ground to precision-fit for complete interchangeability and easy fitting in the field.

2. ALL AIR-OPERATION—of bin gates, asphalt pressure injection and mixer gate. Air-operation is faster and more accurate, and reduces operator fatigue, which increases potential plant output.

3. OVERSIZE CAPACITY WEIGH-BOX—with air-operated gate, 4-point lever suspension, roller-mounted so that it may be quickly rolled out of the way for maintenance of the Twin-Shaft Pug Mill Mixer.

4. EXCLUSIVE BIN DESIGN (Patent Pending)—which prevents "coring out," eliminates segregation within the bin, promotes a more active bin condition with less chilling of the heated aggregate, and assures more uniform filling of the weigh-box.

5. IMPROVED DRIVE ARRANGEMENT—with individual electric motors on hot stone elevator, dust entering screw conveyor, vibrating screen, dust elevator, and pressure injection pump. Mixer may be driven by either electric motor or direct by Diesel.

6. IN-BUILT DUCT WORK—for relieving dust escape pressure on mixer weigh-box housings, bin, hot elevator and screen housings. Designed to draw off vapors, moisture and dust.



Features listed above are only part of the story. MADSEN gives you more than 25 big features in the Model 481 Asphalt Plant . . . important features that aid production, reduce maintenance and save countless dollars in plant operation. Get the complete story from your MADSEN Distributor—ask for Bulletin No. 800

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FOR THE ASPHALT PAVING INDUSTRY

ASPHALT PAVING PLANTS—1000-lbs. to 6000-lbs. BATCH CAPACITY

PUG MILL MIXERS • AGGREGATE DRYERS

DUST COLLECTOR UNITS • ASPHALT TANKS

ROAD PUG TRAVEL MIX PLANTS • WEIGH BATCHERS

ROYAL CROWN PUMP VALVES • ASPHALT AND FUEL PUMP UNITS

SUPER FLOAT AND JOHNSON FLOAT FINISHERS

. . . for more details circle 239, page 16

ROADS AND STREETS, April, 1956



CONSTRUCTION EQUIPMENT DIVISION

MADSEN WORKS

CONSTRUCTION EQUIPMENT DIVISION
Baldwin-Lima-Hamilton Corporation

14120 E. ROSECRANS AVE., P. O. BOX 38
LA MIRADA, CALIFORNIA, U. S. A.

here . . . without a doubt . . . is the most useful buying catalog in your office

. . . and here are some reasons why you should be **USING IT DAILY!**

- Catalogs are **PREFILED** — Saving you time and space required to file individual manufacturers' catalogs.
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- | | |
|--|--|
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| American Steel & Wire Div. | Huber-Warco Company, The |
| Anthony Company | Ingersoll-Rand |
| Armco Drainage & Metal Products, Inc. | International Harvester Co. |
| Arrow Manufacturing Company | Jackson Vibrators, Inc. |
| Austin-Western Company | Joy Manufacturing Company |
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| Butler Bin Company | Mid-Western Industries, Inc. |
| Carey Manufacturing Co., Philip | Minneapolis-Moline Company |
| Chrysler Corporation, Industrial Engine Div. | Naugatuck Chemical Div. |
| Clark Equipment Company | Owen Bucket Company, The |
| Cleaver-Brooks Company | Phoenix Products Company |
| Cleveland Form Grader Co., The | Pioneer Engineering Works, Inc. |
| Cleveland Trencher Co., The | Prehy Company |
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| Goodall Rubber Company | United States Steel Corp. |
| Harnischfeger Corporation | United Steel Fabricators, Inc. |
| Heil Company, The | Wellman Engineering Co., The |
| Heltzel Steel Form & Iron Co., The | Westinghouse Air Brake Co. |
| Henry Manufacturing Co., Inc. | Wick Wire, Spencer Steel Div. |
| | Wico Electric Company |
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| | Wisconsin Motor Corporation |



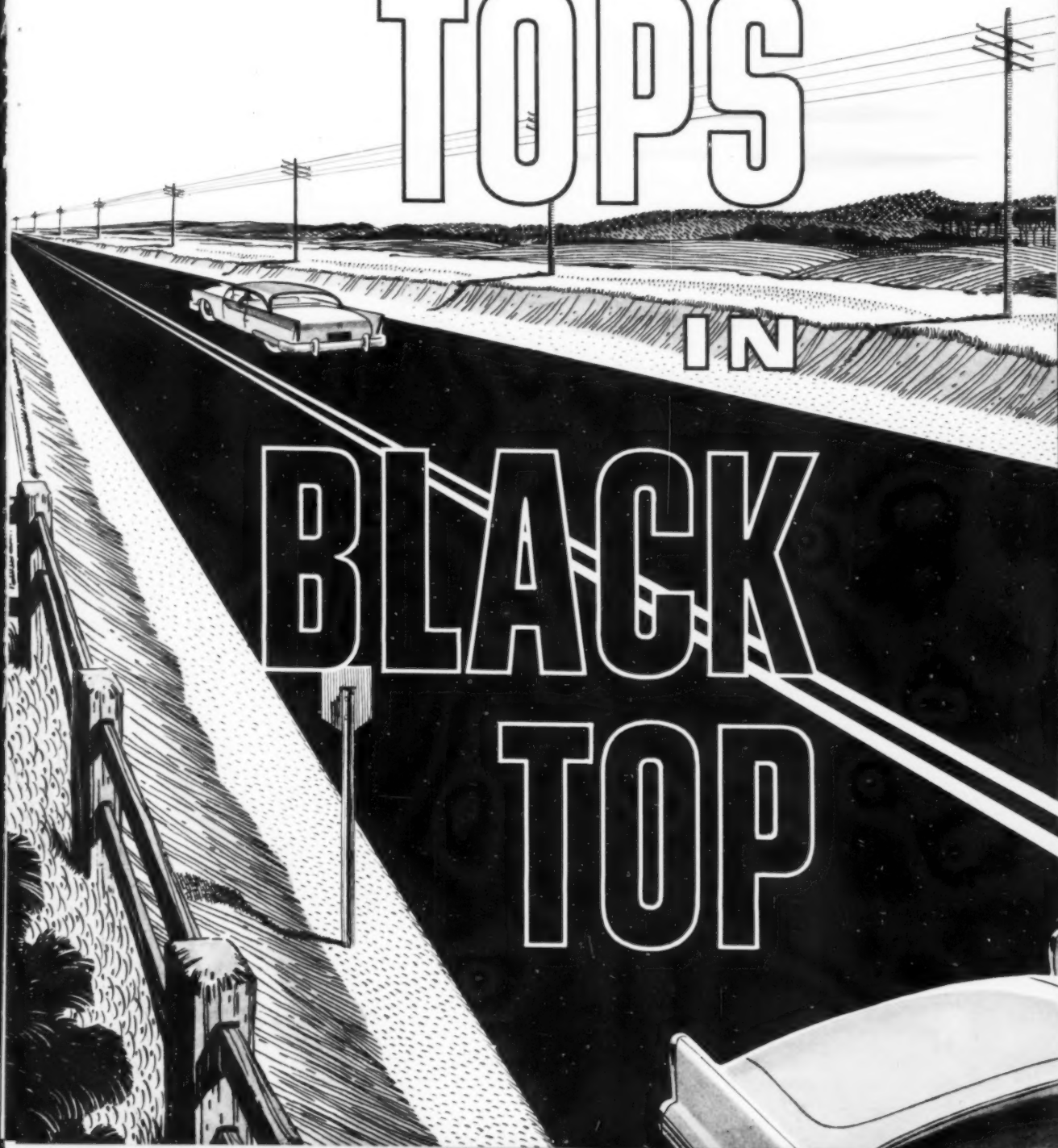
LITTLEFORD

CINCINNATI 2, OHIO

TOPS

IN

**BLACK
TOP**



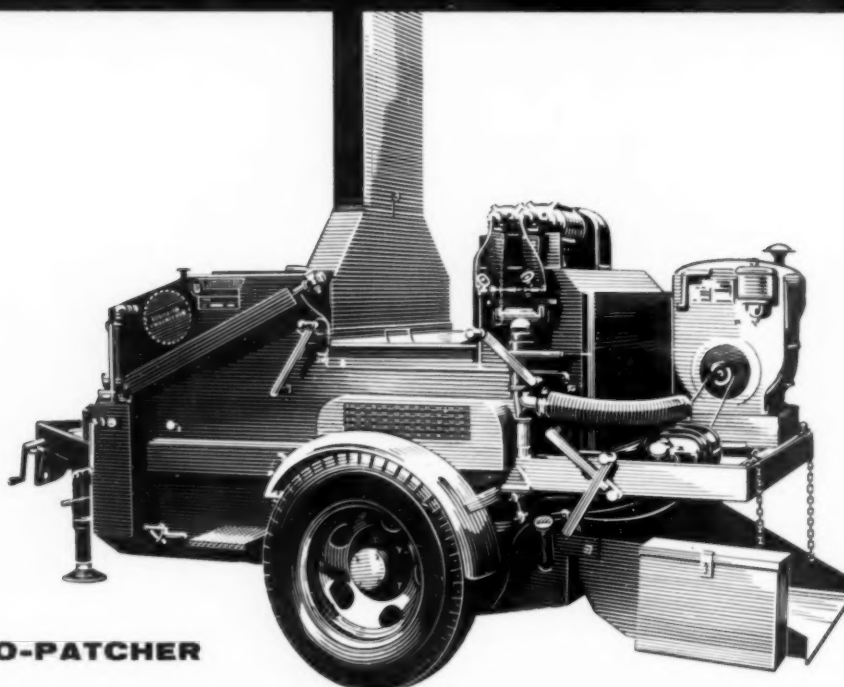


**BITUMINOUS
SUPPLY TANK**

The most efficient means of hauling hot bituminous materials for use in distributors, mixing machines and plants, or to bulk storage. Made in a frameless design. Equipped

with heat flues and burners. Can be provided with pumping units. Single and tandem axle models, 2,000 gallons up to maximum allowable weight. Bulletin 25.

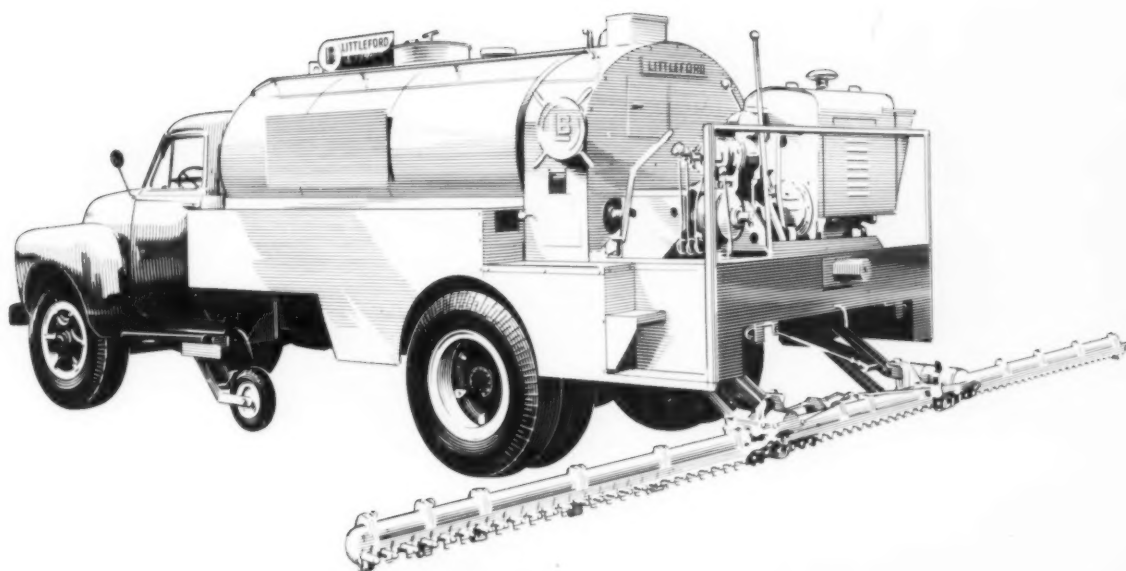
LITTLEFORD



TRAIL-O-PATCHER

Produces hot or cold bituminous concrete right on the job, for patching, paving, or wherever black top is needed. It's self-contained—no other equipment needed. 200-gal. bitumen reservoir

makes it an all-day mixer. And it's an all-weather mixer, too—can be operated in extremes of temperature. Twin pugmills allow thorough mixing and eliminate dust nuisance. Bulletin 28.



Spray Master bituminous distributor

with Full Circulating mechanically operated spray bar

...saves an hour a day

First, you save at least 30 minutes on starting time. The patented damper shuts off the flues, concentrates heat within the heat chamber, thus heating the pump, main valve and piping faster than any other unit. Burners can pre-heat when tank is empty.

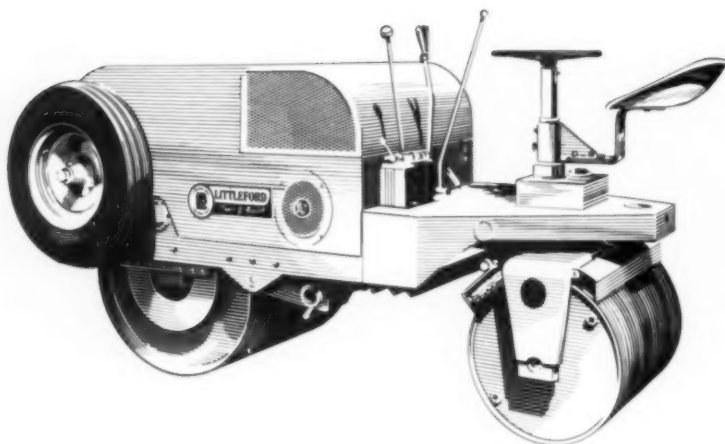
Second, you pick up five minutes on every load thanks to the 2-section full area circulating spray bar which allows the bar to heat to spray temperature faster. Time-saving is but one advantage of the Littleford Spray Master which also offers

- the multi-pass continuous heat flue system at no extra cost (sizes 800 thru 1250-gal. capacity).
- air-cooled flue liner that eliminates burnt out flues forever.
- patented single valve control for spraying, filling, circulating, transferring.
- right angle drive.
- 4-speed transmission with reverse.

For more information showing why the Littleford Spray Master is the best buy in pressure distributors, send today for bulletin FF-14. Littleford Bros., Inc., 300 E. Pearl St., Cincinnati 2, Ohio.



Right-angle drive allows engine to be mounted parallel to the rear head. Eliminates vibration and overhang. Moves engine forward out of spray fog. Clean design and orderly arrangement actually encourages daily maintenance by operator.



PORTABLE ROLLER

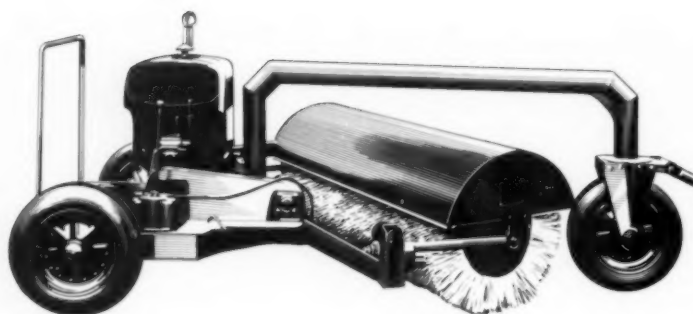
3 models: 2-3 tons (above), 3-5 tons, 4-6 tons, all equipped to give variable compaction. No separate trailer required to transport roller. Easily hitched to towing truck. Bulletins 20, 24 and 32.



UTILITY SPRAY

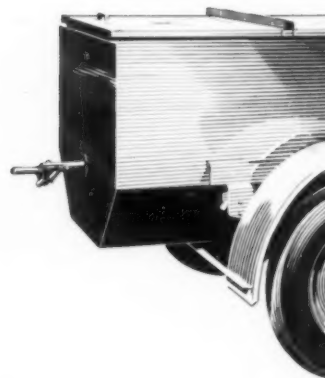
Perfect for municipality work: hand spraying and for crack and pothole filling. Model shown; also available in other sizes.

the world's most complete line of com



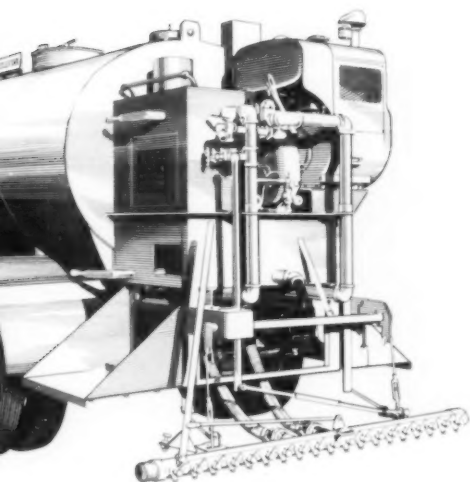
2-WAY ROAD BROOM

Sweeps right or left. Has exclusive wear-reducing hydraulic lift that raises, lowers and supports the heavy duty brush. Power and traction driven models; sprinkler and blower attachments available. Bulletin 19.



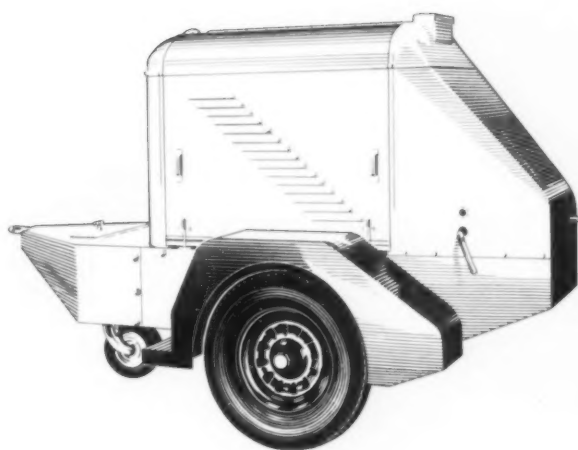
TAR AND ASPHALT

The 84HD, with its patented delivery system, delivers more "hot stuff" faster and safer. Hand spray and motorized models available.



TY SPRAY TANK

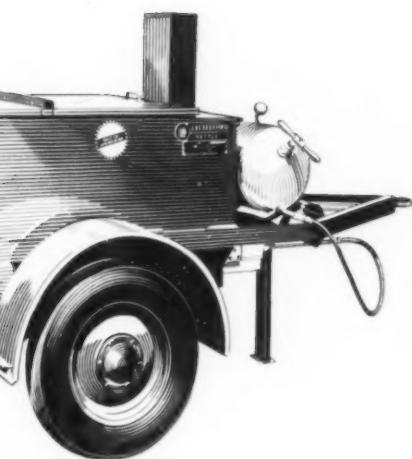
ty work: for small application jobs, for
r crack and joint filling. Truck mounted
available in trailer type. Bulletin 5.



TANK CAR HEATER

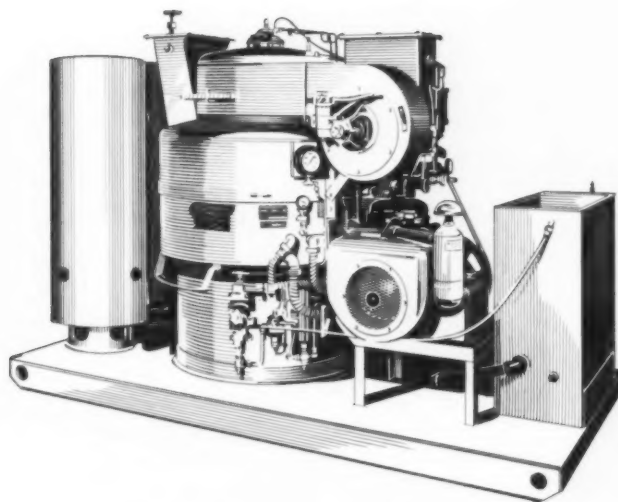
34½ bhp. portable steam generator delivers 200 lbs. of steam
2 minutes after starting burner. Self-sustained, holds enough
water, oil and gasoline to operate all day. Completely automatic.
Bulletin 21.

completely engineered black top equipment



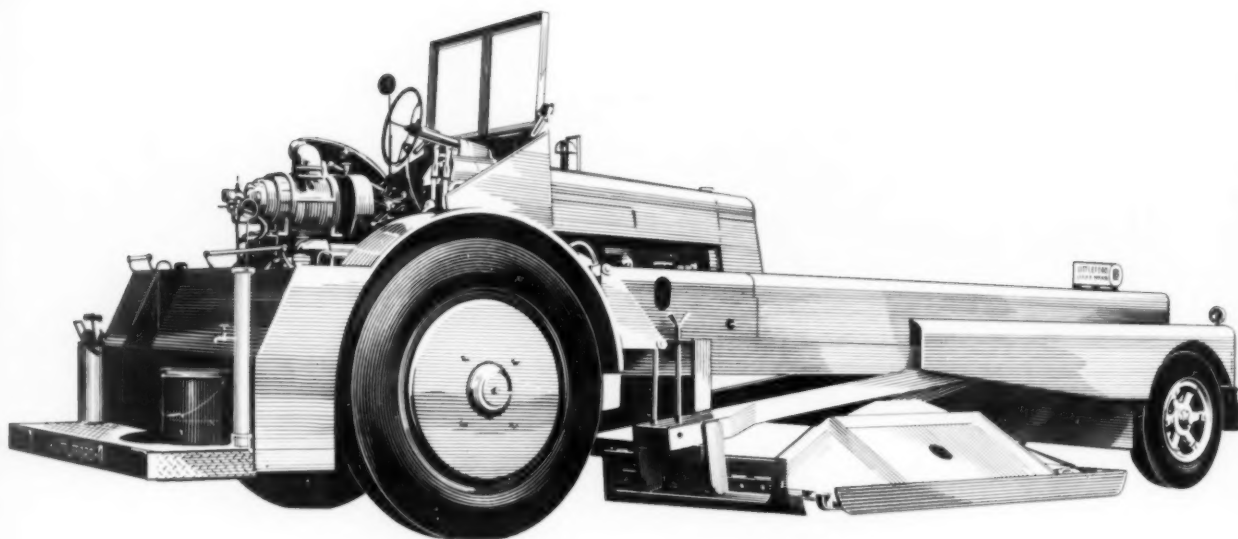
D ASPHALT KETTLE

patented double heat circulation system,
uff" faster, at lower cost and with greater
and motor spray attachments. Bulletin 1.



KWIK-STEAM GENERATOR

Delivers steam in 2 minutes from a cold start! Automatic modu-
latic control cuts fuel consumption 50%. Sizes 20 to 165 bhp.
Designed for year-round ready mix, pile driving, concrete prod-
ucts curing and for asphalt plants. Bulletin 22.



Littleford-Clarkmoore Heater-Planer and Surface Heater introduces a new technique in street maintenance

The Littleford-Clarkmoore Heater-Planer planes the road surface so smooth you can lay the surface course directly on it . . . thus introducing a whole new technique in street and highway maintenance.

This ingenious giant—at last—permits complete resurfacing of city streets. Adequate maintenance has been impossible heretofore because of the lack of an efficient tool for removing excess bituminous concrete accumulated layer on layer, year after year.

But now the Littleford-Clarkmoore Heater-Planer not only removes the excess material, it also heats and planes a firm, smooth base for the new surface and helps keep it at the proper level.

Conservative estimates indicate the new Heater-Planer will save a minimum of 63¢ a square yard on black top maintenance. For complete information on the money-saving and other advantages of the Littleford-Clarkmoore, write for bulletin 18. Littleford Bros., Inc., 300 E. Pearl St., Cincinnati 2, Ohio.



Planed materials re-used

Blades are positioned so as to windrow the material behind heater-planer where it can be picked up and re-used. Other Littleford-Clarkmoore engineered advantages:

- Hydraulic creeper gear drives the planer smoothly from 8" per minute to 35 fpm.
- Heats and planes 81" wide path in one continuous operation.
- Planes from a skin cut to a depth of 1".
- Single engine and transmission controls and propels planer.



Liquified Petroleum

Gas Fires

Asphalt Plant Drier

LIQUID petroleum gas made its bow in 1955 as a possible burner fuel for operating the drier on asphalt plant production. Dobson Construction Company, Lincoln, Nebraska, used the fuel in producing 20,000 tons of asphalt mix during a 4-week period, on a state highway resurfacing job southwest of Omaha.

The plant was a Hetherington and Berner plant, model PA-20, having a 60 in. x 24 ft. drier and a 2500 lb. pugmill.

According to Anthony Vidlak, Dobson's project engineer, the use of this fuel became of interest to them on projects in areas not served by natural gas lines. Fuel for this installation was supplied from a battery of twelve LP-Gas storage tanks manufactured by Delta Tank Manufacturing Co., specialists in tanks for the petroleum and chemical industries. The tanks were each of 1,000 gal. capacity, measuring 16 ft. long and having a diameter of 41 in. The system was designed and placed in operation by a local distributor of such equipment.

Gas consumption averaged about 1,500 gal. per day in turning out 650

to 700 tons of asphalt mix daily. Gas fed at tank pressure through a manifold connecting the tank battery, pressure reducing to 50 lb. at the burner. Operating economies are reported by this installation, although the contractor had some difficulty in keeping pressure up to requirements at the burner, with the result that additional tanks were required.

National Blacktop Association holds board meeting

The National Bituminous Concrete Association, organized some months

ago, rolled up its sleeves recently as the board of directors met in Chicago.

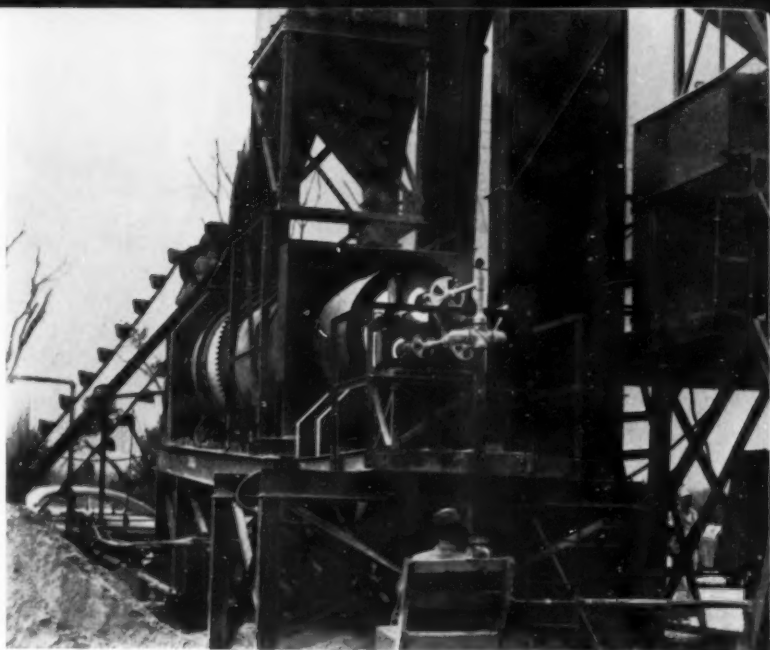
The aims of this association as reviewed by president Sheldon G. Hayes, Detroit paving contractor, are to be primarily educational and promotional, supplementing the technical and research work presently being done on a national scale by the Asphalt Institute. He pointed to the shortage of engineers, particularly those with bituminous paving knowledge, and the need to stimulate interest among beginners in a long-range effort to develop engineering talent that will help the industry.

Plans for development of association activities contemplate the possible opening of a national office which would disseminate educational material.

The present membership of the association is made up of representatives of 10 state associations, each consisting of contracting firms, specializing in hot mix asphaltic concrete work.

The membership also includes individual contractor or aggregate producer firms in a number of states and associate members in the field of equipment and material supply.

●South Dakota used 2,776 carloads of bituminous road materials in 1955 in state highway maintenance, resurfacing, sealing and new construction. A total of 25,193,000 gal. was used, 84.5% for construction and 15.5% on maintenance. The 1956 program will use 29,000,000 gal. according to W. N. Lovejoy, Bituminous Engineer.



● Showing asphalt plant of Dobson Construction Co., Lincoln, Nebr.; burner equipped for firing with LP-Gas supplied by twelve 1,000 gal. tanks.



● Newly elected divisional vice presidents of The Asphalt Institute, College Park, Md., are shown here with the new chairman of the Executive Committee Sidney Golden of Shell Oil Co., New York (seated, center). Others are Floyd Reed, American Bitumuls & Asphalt Co., Cincinnati; Ted R. Ellis, The Texas Co., New York; Don Fox, Derby Refining Co., Wichita, Kan.; Don Nielsen, Union Oil Co. of California, Los Angeles; Robert Ketcham, Anderson-Prichard Oil Co., Oklahoma City., Okla.



- Applying penetration asphalt and rolling chip-covered material, nearing finish of new 12-ft. outer shoulder. Barrett Paving Co., of Trenton, subbed this work from S. J. Groves & Sons.

NEW JERSEY TURNPIKE WIDENING CONTRACTS AND SOME OF MAJOR ITEMS

Contract	W-1	W-2	W-3	W-4	W-5	FE-4	FE-5
	Belmont Iron Works	S. J. Groves & Sons Co., Woodbridge, N.J.	Reid Contracting Co., Woodbridge, N.J.	Savin Const. Co., E. Hartford, Conn.	Union Bldg. & Contracting Passaic, N.J.	C.J. Langenfelder & Sons, Inc. Baltimore, Md.	Kingston Bituminous Products Co., Kingston, N.J.
Award Price	\$380,000	\$4,966,712	\$7,303,287	\$5,707,338	\$2,733,376	\$1,780,000	\$2,586,000
Job Covered	Bridge Steel	15.97 miles grade, drain and pave	22.38 miles grade, drain and pave	16.88 miles grade, drain and pave	5.44 miles grade, drain and pave	Includes 1.8 miles of widening as part of interchange and connector road with Penn. turnpike	
Location	Throughout	North Camden to Penn. turnpike connector	N. from W-2 to Cranbury N.J.	N. from W-3 to Woodbridge	Lincoln tunnel interchange to N. end of pike	Connector interchange, north of Camden	

Paving Methods (Continued from page 167)

Stone for each course was required to be spread mechanically, consolidated with a shoe-type vibrating tamper in several passes, followed by two passes of a 3-wheel steel roller to insure proper keying of the aggregates. Stone was laid against a neatly trimmed vertical edge of the existing pavement base.

A typical equipment team for base

construction was that of Reid on W-3, where heavy-duty Blaw-Knox stone spreaders were followed by a Jackson vibrator, Galion roller and 3-axle bump roller.

Penetration asphalt of 100-120 grade was then applied at a rate between 0.38 and 0.54 gal. per sq. yd. per in. depth as determined by the engineer. Then $\frac{3}{4}$ or $\frac{1}{2}$ in. choke stone was immediately applied and the course thoroughly consolidated with

3-axle bump rollers plus a rubber-tired roller or construction equipment weighing at least 25,000 lb. on each tire. When considered necessary a second penetration application was made at 0.25 to 0.35 gal. per sq. yd., followed by $\frac{3}{4}$ in. choke stone and a repeat of the above rolling.

After acceptance of the first course by the inspectors with respect to thickness and penetration depth, the second course was placed by similar

- Asphaltic curbs were placed at edges of higher fills where the slope was 2:1. Curbs hand-formed in trench, using 1" x 8" backboard for forming.



methods. Surface tolerances for the two layers were $\frac{3}{8}$ in. and $\frac{1}{2}$ in. respectively.

Special specifications for this job were set up to insure that proper use of anti-stripping additives would be made where found necessary.

Where the contractor was only slightly off from the evenness tolerance in the upper base layer, he could correct low spots in placing the leveling course that followed. If over $\frac{1}{2}$ in. off, however, a separate leveling course or wedge had to be placed.

Asphaltic Concrete. Preparatory to placing the three $1\frac{1}{2}$ in. courses of asphaltic concrete, the adjacent pavement was trimmed with care. With most contractors this was done for the lower and middle course usually by means of a special cutting tooth mounted in a scarifier tooth socket of a motor grader.

Hot Mix Construction

The joint surface was cleaned and tack coated. Hot mix construction then proceeded using standard New Jersey turnpike methods, except for the special rules required in working under traffic. The final pavement was rolled to a tolerance of $\frac{1}{8}$ in. in 16 ft. The joint making procedure following completion of the first two asphaltic layers, was for the engineer, following inspection of the condition and elevation of the existing pavement edge, to determine the location of a saw cut along the outer edge. This could be anywhere within 12 in. of the existing edge, but usually was about 6 or 8 in. A chalk line was then drawn and concrete power saws were used to make a $1\frac{1}{2}$ in. deep cut along this line. Next, using a motor grader with closely spaced scarifier teeth, the 6 to 8 in. wide by $1\frac{1}{2}$ in. thick segment of pavement outside the saw cut was chipped off using a motor grader with special closely spaced ripper teeth. This left a shelf for lapping the new surface course over the old remaining pavement layers.

Shoulders. An important design change from the existing turnpike was to make the new shoulders 12 ft. wide instead of the 10 ft. previously pro-



● Tamping subgrade borrow material for ramp widening at interchange. Barco rammer in use. Savin project W-4.

vided. This was deemed necessary to give more room for motorists to park vehicles in emergencies and make tire changes with less danger. The new shoulders, placed on a compactor pre-tested subgrade, consist of a 10-in. course of gravel and a 3 in. top course of penetration macadam. The contractor had his choice of layer thickness, and for the most part placed the 10-in. in two lifts, using spreading, vibrating and rolling equipment similar to that used for the base under the new traffic lane. Penetration details also were similar.

Inner Shoulders. Where traffic lanes were moved temporarily inward during the widening, to provide room for the intervening barrier curb, the inner shoulder had to serve as part of a pavement lane.

The inside shoulder was required to be treated as follows: (1) At all resurfacing areas, it was given a 3-in. penetration macadam surface; (2) After construction activities on other parts of the roadway were completed and traffic no longer had to use the inside shoulder, the entire area was to be given either a single bituminous surface treatment or; (3) at the op-

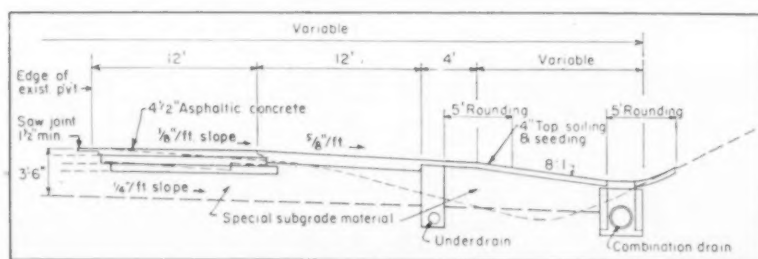


● Hero of the widening were the traffic cones, which were used in great numbers. Cones had to be anchored against whipping air currents from passing trucks. Ordinary dirt proved expedient, but had to be kept off traffic lanes.

tion of the Turnpike Authority, the entire inside shoulder, except as provided in (1) was to be surfaced with a 3-in. penetration macadam course, and the area in (1) surface treated.

In places reinforced shoulders were specified, involving an additional 3 in. layer of compacted stone between base and penetration course.

Material for the base course of all shoulders was a mixture of 2-in. maximum stone and other material meeting specified gradation requirements. Where the old shoulder material required supplementing, stone graded between $1\frac{1}{2}$ in. and No. 4 was added. Penetration stone and choke stone followed gradations for such work.



● A typical cut section in unsuitable material.



● Bridge widening was a bottleneck in the job. With a few exceptions the structures had to be widened clear down to footing piles, and decks extended, working back to barriers.

Lip Curb at Fill Edges. Following the re-setting of guard rails along the edges of new widened fills, erosion prevention measures were applied consisting of an asphalt concrete dam built in a shallow trench just inside the rail. Some 85,000 lin. ft. of this construction was placed in all, using asphaltic paving mix. The dams were formed and tamped by hand against 2" x 8" backboards leaving gaps at run-down locations.

Also to discourage erosion of the new cut slopes, earth dams approximately six inches high were left by the dozer operator at the tops of backslopes. Despite such measures, however, the late-summer hurricane and tropical storm resulted in some damage to the raw slopes. The contractors had to do considerable re-dressing, and in some cases remove and replace seed and mulch.

General Notes. The "shoestring" nature of the widening operations made it necessary for the contractors to open up the work considerable distances ahead. For example the sub-base work stretched out as much as

two miles ahead of the base, and the three asphaltic concrete lifts were often in progress at about one-mile intervals. On the three longer contracts, paving was thus in varying stages over as much as 10 miles, while grading and bridge widening work was still going on in other parts of the job.

Ramp relocation and widening at interchanges was a major operation, involving considerable paving yardages and also high labor and equipment costs due to the inability to apply volume production procedures. Front-end loaders or tractor shovels played an important part in excavating old shoulder material, trenching, handling curb forms, etc.

Traffic Protection. The turnpike engineers had many anxious moments during the season, watching to see how the novel specifications on traffic protection were working out. One of the constant problems was that of enforcing proper flagging procedures, which required the constant attention of the highway police.

The contractors needed close

watching on observance of the specifications governing when and where to use barrier curbs. This often tied up the inspectors who needed to devote their time more completely to construction quality control — this was one of the many bits of hindsight gained during the season's experience. The contractors "cussed" the requirement of barrier curbs, but actually gained by their use, in the viewpoint of the engineers. The curbs enabled the contractors, under the specifications, to put in long week-ends which they badly needed to clean up the paving in the 1955 late-autumn. Most contractors worked "daylight to dark," with 8 hours on Saturday when necessary.

Enforcing "Slow" Signs

Another observation was the difficulty of enforcing "Slow" signs. Auto and truck drivers, as pointed out by turnpike chief engineer Charles M. Noble, have an entirely different psychological attitude toward such restrictions, compared to their attitude when driving ordinary highways. They expect to make good speeds, and are intolerant of slow orders.

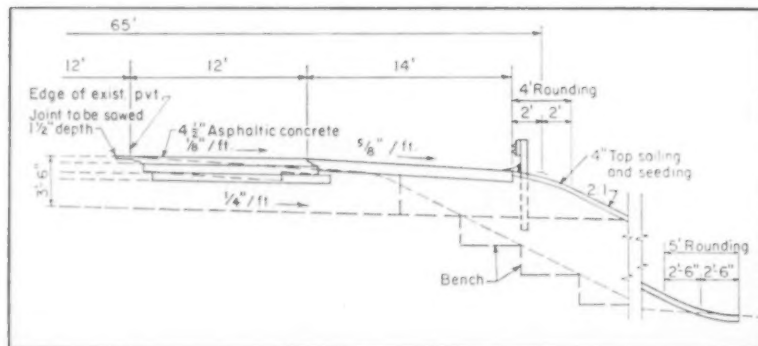
Supervision. The 6-mile section through the marsh at the northern end is under the supervision of Porter, Urquhart, O'Brien & McCreary, consulting engineers of Newark, serving as section engineers on design and supervision. The portion south of Woodbridge is under DeLeuw, Cather and Brill, of New York City.

Charles M. Noble is chief engineer of the New Jersey Turnpike Authority of which W. W. Wanamaker is executive director, with Stanton C. Funk and William J. Delaney, assistant chief engineers, H. W. Goldberger, construction engineer and Edmund R. Ricker, traffic engineer. Howard, Needles, Tammen and Bergendoff are general consultants for the Turnpike Authority.

Pennsylvania speed study

Results of a speed limit study conducted by the Pennsylvania Department of Highways in cooperation with the U. S. Bureau of Public Roads reveal that 13.8% of all passenger cars on the Interstate System exceed the 50 mph legal speed, Secretary of Highways Joseph J. Lawler said recently. Only 3.6%, however, exceeded 55 mph, the check shows. On three routes posted at 60 mph only 3.2% of passenger cars exceeded the limit.

The purpose of the study was to determine normal speed distribution, average speeds and speed trends on rural highways.



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... for more details circle 183, page 16

ROADS AND STREETS, April, 1956

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Plus UNMATCHED ON-THE-JOB ADAPTABILITY!

For consolidating granular soil sub-bases and the base courses of sand, gravel, rock or slag in waterbound and penetration macadam construction, there is just nothing that compares with the Jackson Vibratory Multiple Compactor. It not only does the straight-away work in only half the time required by equipment of other types, but is so versatile, so easily adaptable on the job that it can be used to great advantage for widening projects of any width and getting into places other equipment can not touch. As may be noted in the illustrations, any number of compacting units may be used in the workhead (up to 6, which covers 13', 3") to exactly fit the job at hand. Units may be towed at the side or fitted with operating handles and used as individual, self-propelling compactors. Quickly interchangeable bases from 12" to 26" are also available for compacting in trenches, etc.

For compacting granular soil fills of all kinds, the Jackson Multiple Compactor is a terrific cost saver and progress expeditor. It's the predominant medium of consolidation used on the outstanding paving jobs in the country today. See your Jackson distributor for complete details. We will gladly furnish his name, and literature, on request.

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6 COMPACTING UNITS IN WORKHEAD for maximum productivity in straight-away work. Left: Compacting sand fill in a bridge approach . . . another phase of its wide range utility to paving contractors.



4 COMPACTING UNITS just fit this widening job—change required in only a few minutes.



3 COMPACTING UNITS in tandem and staggered, suits this job ideally—a quick and easy change.



1 COMPACTING UNIT fitted with operating handle and narrow base. Just right for the otherwise unreachable spots.



2 COMPACTING UNITS in twin hook-up—self-propelling. One man readily compacts up to 4000 sq. ft. per hr. in 10" layers.

Asphalt Institute notes on research program

At its recent Annual Meeting Asphalt Institute leaders reviewed the Institute's research program, taking form at its new headquarters at College Park, Maryland. As described by Chief Engineer Arvin S. Wellborn, an extensive program is in progress to develop new laboratory data on the test properties of asphalt paving mixtures. There will be tests on a wide variety of types and gradations of aggregates commonly used in paving. From this study the Institute expects to establish general trends which will help engineers in designing better mixes. Detail studies of the test methods themselves will also be made, with the aim of ultimate improvement in techniques.

A second phase in the research is aimed at devising a new and a different approach to the designing of paving mixtures, which Institute leaders point out are highly empirical and correlate little with the service behavior of the pavement.

At the Institute's annual meeting a progress report on this program was made by Bernard E. Gray.

At the meeting the chairman of the Institute's Educational Aid Committee, M. O. Huntress, reported establishment of two new asphalt fellowships by Shell Oil Company and Esso Standard Oil Company, and five "scholarship-sponsorships" for undergraduate study by Socony Mobil Oil Company.

Huntress also told that a survey of laboratory facilities among engineering colleges was made by his committee and turned up serious deficiencies in asphalt testing equipment. He urged that member companies in the five geographical divisions of the Institute move to fill these equipment gaps by cash grants, gifts or extended loans of needed equipment in order to stimulate academic interest in asphalt technology.

Rubber-in-asphalt for South Dakota sealcoating

Bids were asked February 28 by the South Dakota department of highways for 150 miles of this state's 180-mile program of sealing for 1956.

One point of interest was the early date of lettings in this State, where a determined effort has been made to get projects in time for contractors to make an early start in the spring.

Another development was the State's decision to ask for bids on rapid curing cut back asphalt and 3% synthetic rubber for sealcoating.

... for more details circle 226, page 16

**Built in '24
Rebuilt since...**

**Still has
original
tank!**



**One of
16 Allied
Etnyres in
operation
during '55**

Ease and accuracy of Etnyre operation help Allied Bitumens break-in "green" men

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According to C. W. Allemeier, Secretary of Allied: "This long life, excellent service, and low upkeep are important reasons why we continue to buy Etnyres." Including two new Etnyres delivered in 1955, the Allied fleet now

consists of sixteen "Black-Toppers."

As Mr. Allemeier points out, his is a seasonal business, requiring the annual break-in of many new drivers. This problem is simplified by the ease and accuracy of Etnyre operation.

With experience like this to guide you, why put up with anything but the very best in distributing equipment? Contractors everywhere agree that you'll turn out better jobs, in less time, at lower cost with Etnyres. Get all the facts — see your nearby Etnyre Dealer, or write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

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BITUMINOUS DISTRIBUTORS

... for more details circle 204, page 16

ROADS AND STREETS, April, 1956



ARBA Officers for 1956

County and Local Roads Division

President: Allan M. Williams, engineer-superintendent, Ionia County Road Commission, Ionia, Michigan.

Vice-Presidents: Levi Bird Duff, director, Alleghany County Dept. of Works, Pittsburgh, Pa.; A. N. Sollee, Duval County engineer, Jacksonville, Fla.; James T. Holden, Licking County engineer, Newark, Ohio; T. W. Switzer, Visalia, Calif.

Directors (1959): Frank D. Tyson, Rooks County engineer, Stockton, Kans.; Paul A. Hartwig, commissioner, LaCrosse County Highway Dept., LaCrosse, Wis.; Lewis A. Lush, county superintendent of highways, Sangamon County Highway Dept., Springfield, Ill.; Wade D. Thomson, Madison County engineer, Jackson, Tenn.; A. T. McDonald, director, Public Works Dept., Fulton County, Atlanta, Ga.; Sterling D. Jones, chairman, Utah County Comm., Provo, Utah; Charles J. Geissler, Sullivan Co. super. of highways, Barryville, N. Y.

Directors (1958): Pat Thomson, Douglas County engineer, Waterville, Wash.; D. W. Leonard, Jackson County planning engineer, Kansas City, Mo.; R. B. Burleson, Cherokee County engineer, Centre, Ala.; C. A. Peterson, director of public works, Pinellas County, Clearwater, Fla.; Paul Rynning, Jackson County engineer,

Medford, Ore.; Otto S. Hess, engineer-manager, Kent County Road Commission, Grand Rapids, Mich.; E. M. Baylard, Onondaga County superintendent of highways, Syr., N. Y.

Directors (1957): Joe Abramson, Caddo Parish engineer, Shreveport La.; J. C. Akers, Davidson County engineer, Nashville, Tenn.; Earl Coyne, superintendent of highways, Brown County, Aberdeen, S. D.; M. Y. Kinne, Hamilton County engineer, Webster City, Iowa; F. A. Robb, Coos County engineer, Coquille, Ore.; Roger Willard, Frederick County engineer, Frederick, Md.; George Batty, Columbia Co. comm., Portage, Wis.

Educational Division

President: James W. Spencer, highway research and extension engineer, Cornell University, Ithaca, N. Y.

Vice-Presidents: A. J. Bone, professor of highway and airport engineering, Massachusetts Institute of Technology, Cambridge, Mass.; Radnor J. Paquette, professor of civil engineering, Georgia Institute of Technology, Atlanta, Ga.; Emmett H. Karner, professor of highway engineering, Ohio State University, Columbus, Ohio; Bob Glenn, engineer and extension representative, University of California, Richmond, Calif.

Directors (1959): Willard F. Babcock, professor of civil engineering, North Carolina State College, Raleigh, N. C.; S. Ball, professor, Nova Scotia Technical College, Halifax, Nova Scotia; John E. Stoner, professor, Col-

lege of Arts & Sciences, Department of Government, Indiana University, Bloomington; John C. Kohl, professor, Transportation Institute, University of Michigan, Ann Arbor, Mich.; Richard H. Meese, professor, Department of Civil Engineer, University of Washington, Seattle; Ren G. Saxton, professor of civil engineering, Oklahoma A & M College, Stillwater; Harmer A. Weeden, professor, Department of Civil Engineering, The Pennsylvania State University, State College, Pa.

Directors (1958): Ladis H. Csanyi, professor of civil engineering, Iowa State College, Ames, Ia.; Ellis Danner, professor of highway engineering, University of Illinois, Urbana, Ill.; C. Calor Mota, professor, University of Puerto Rico, Mayaguez, Puerto Rico; John A. Oakey, professor of civil engineering, North Dakota Agricultural College, State College Station, Fargo; Ben H. Petty, professor of highway engineering, Purdue University, Lafayette, Ind.; Jose Sust, professor of civil engineering, University of Havana, Cuba; John A. Focht, professor of civil engineering, University of Texas, Austin.

Directors (1957): J. Gardner Bennett, department of civil engineer, University of Hawaii, Honolulu; Fred J. Benson, professor of civil engineering, Texas A. & M. College, College Station; T. L. Bransford, department of civil engineering, University of Florida, Gainesville; Martin P. Coopey, professor of civil engineering, Oregon State College, Corvallis; Robert Hennes, professor of civil engineering, University of Washington, Seattle; Sumner B. Irish, assistant professor of civil engineering, Princeton University, Princeton, N. J.; Miles B. Potter, associate professor of civil engineering Villanova University, Villanova, Pa.

Municipal and Airport Division

President: T. J. Montgomery, City engineer, Cincinnati, Ohio.

Vice-Presidents: Stanley L. Vale, assistant manager, Traffic and Transportation, Chamber of Commerce, Pittsburgh, Pa.; Bill L. Bryant, assistant city engineer, Jacksonville, Fla.; Leslie Bryan, director, Institute of Aviation, University of Illinois, Urbana, Ill.; Howard S. Kaulbach, street maintenance engineer, Oakland, Calif.

Directors (1959): George W. Andress, director of public works, Newark, N. J.; J. D. Wright, director, public works, Lynchburg, Va.; C. A. R. Distelhorst, engineer, street construction, Milwaukee, Wis.; R. W. F. Schmidt, manager, Tucson Airport

ARBA Officers and Directors for 1956

President: John N. Robertson, director of highways, District of Columbia, Washington, D. C. (re-elected).

Vice-Presidents: Charles M. Noble, chief engineer, New Jersey Turnpike Authority, New Brunswick, N. J.; Charles W. Smith, president, Smith Engineering and Construction Company, Pensacola, Fla.; Julien R. Steelman, president, Koehring Company, Milwaukee, Wis.; W. A. Bugge, director of highways, Olympia, Washington.

Treasurer: Jennings Randolph, assistant to the president, Capital Airlines, Washington, D. C.

Directors (1959): E. F. Brinker, manager, Highway Products Sales, Aluminum Company of America, Pittsburgh, Pa.; J. E. Buchanan, president, The Asphalt Institute, College Park, Md.; William A. Danner, Parker-Danner Company, Hyde Park, Mass.; George Diebler, St. Louis County highway engineer, Duluth, Minn.; R. W. Hyde, Jr., Hyde Construction Company, Jackson, Miss.; Joseph R. Perini, B. Perini & Sons, Framington, Mass.; Harold L. Plummer, chairman, Wisconsin Highway Commission, Madison.

Directors (1958): John T. Moss, president, Moss-Thornton Construction Company, Leeds, Ala.; George H. Kimber, president, Calcium Chloride Institute, Washington, D. C.; Ben H. Petty, professor of highway engineering, Purdue University, Lafayette, Ind.; W. B. Greene, chairman of board, Barber-Green Company, Aurora, Ill.; A. L. Burrus, executive secretary, Tennessee Limestone Producers Association, Nashville; George M. Foster, chief deputy commissioner, Michigan State Highway Department, Lansing.

Directors (1957): Robert F. Boger, McGraw-Hill Publishing Co., New York, N.Y.; Alan N. Buck, county superintendent of highways, Macon County Highway Department, Decatur, Ill.; W. L. Chilcote, deputy highway engineer, Department of Public Works, Baltimore, Md.; Armand E. Keeley, president, Prismo Safety Corp., Huntingdon, Pa.; Boyd S. Oberlink, vice-president, Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.; M. L. Shadburn, state highway engineer of Georgia, Atlanta, Ga.; Donald O. White, president, American Asphalt Paving Co., Chicago, Ill.

Authority, Tucson, Ariz.; James J. Sullivan, superintendent, Department of Streets and Engineering, Springfield, Mass.; R. W. McLeese, city engineer, Salt Lake City, Utah; Francis A. Bolton, superintendent, Columbus Municipal Airport, Port Columbus, Ohio.

Directors (1958): K. H. Ringrose, director, Connecticut Dept. of Aeronautics, Hartford; K. L. Chrysler, city engineer, Great Falls, Mont.; G. M. Nelson, director, Wyoming Aeronautics Commission, Cheyenne; A. N. Hallberg, city engineer, Moline, Ill.; C. H. Gartrell, commissioner, Kentucky Dept. of Aeronautics, Frankfort, Ky.; R. F. Coleman, Jr., city engineer, Wilmington, N. C.; A. H. Armstrong, manager, Newark Airport, Newark, N. J.

Directors (1957): T. A. Bradley, city engineer, Paducah, Ky.; Howard E. Evans, city engineer, Fort Collins, Colo.; H. R. Goodspeed, city engineer, Joliet, Ill.; A. B. Hopkins, city manager, Tallahassee, Fla.; Louis R. Inwood, director of Aviation, Philadelphia, Pa.; Thomas K. Jordan, director, Wisconsin State Aeronautics Commission, Madison; Collins E. Thornton, director of public service and city engineer, Lansing, Mich.

Contractors Division

President: John P. Moss, Moss-Thornton Construction Co., Leeds, Ala.

Vice-Presidents: E. V. Williams, Williams Paving Co., Norfolk, Va.; Rudolph Kraemer, Edward Kraemer & Sons, Plain, Wis.

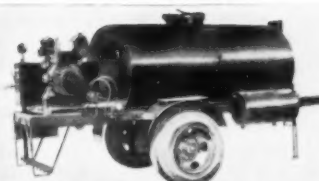
Directors (1959): A. I. Savin, Savin Construction Corp., E. Hartford, Conn.; A. R. Ramers, Standard Paving Company, Chicago, Ill.; Robert McDowell, McDowell, Nashville, Tenn.; Ernest M. Brown, Brown & Wright, Princeton, W. Va.; Philip V. Corey, W. H. Hinman, Inc., Eastbrook, Maine; C. P. Calaway, Toledo, Ohio; T. F. Hobart, Southern Amiesite Asphalt Co., Birmingham, Ala.; R. W. Hyde, Jr., Hyde Construction Co., Jackson, Miss.

Directors (1958): E. B. Cape, Gulf Bitulithic Co., Houston, Texas; H. M. Warren, Warren Bros. Roads Co., Birmingham, Ala.; J. W. Thompson, Thompson-Arthur Paving Co., Greensboro, N.C.; E. V. Williams, Williams Paving Co., Norfolk, Va.; Austin Page, Lane Construction Corp., Meriden, Conn.; O. W. Merrell, Whitaker-Merrell Co., Columbus, Ohio; James E. Lambert, Lambert Construction Co., White River Junction, Vt.; Robert M. Young, Cornell-Young Company, Macon, Ga.

Directors (1957): William O. Faylor, Middlecreek Construction Co., Middleburg, Pa.; J. W. Allen, J. W. Conner & Sons, Inc., Tampa, Fla.; L. A. Davidson, Lansing, Mich.; Donald E. Ball, Northern Virginia Construction Co., Alexandria,



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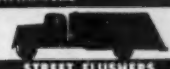
BROOMS



SUPPLY TANKS



TAR KETTLES



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Minneapolis 6, Minnesota

... for more details circle 252, page 16

Va.; E. D. Sloan, Sloan Construction Co., Inc., Greenville, S.C.; Donald Stabler, Harrisburg, Pa.; E. N. Rodgers, engineer-manager, Alabama Road Builders Association, Montgomery.

Directors-at-Large (One - year term) (1957): R. M. Robinson, Owensboro, Ky.; G. H. Langenfelder, C. J. Langenfelder & Son, Baltimore, Md.; John J. Curtin, Curtin & Johnson, Inc., Washington, D. C.; Francis J. Butler, Butler Construction Co., Grand Forks, N. D.; H. G. Smith, Fitzgerald, Ga.; L. M. Hayes,

Rock Road Construction Company, Madison, Wis.; Sam Gottlieb, H. E. Wolfe Construction Co., St. Augustine, Fla.

Radzikowski on engineers manpower requirements

A perspective on the engineer situation was given by H. A. Radzikowski, Chief, Maintenance Branch, Bureau of Public Roads. In a paper "Productivity of Engineering," he reviewed basic figures developed by the AR-

BA Task Committee early in 1955 on industry capacity. Currently about 8 engineers are required per million dollars of highway work as a national average, with 4 engineers per million under the "best" conditions. Assuming the latter ideal rate, this would mean 4,000 engineers are needed to plan, program, design and construct each additional increment of a billion dollars of highway work per year. Only about 4,000 civil engineers graduate from college each year. Since many of these will replace retirements and others will not enter highway work, these figures point up to a growing deficit, since highway work has been advancing at about the rate of one billion dollars increase per year at about 6/10 of a billion dollars per year for construction, alone.

Among the avenues which must be explored, Radzikowski suggests the following:

1. Step-up means of attracting civil engineers into highway work, by improving salaries and improving personnel practices.

2. Consider adopting radio-telephone communication as standard equipment for resident engineers, so that they can conserve their time and spread their work over more than one project or over larger projects.

3. Put electronic computers to work as a means of saving time and expense and also as a means of permitting broader and more intensive investigation which would lead to more economical location and design and more rapid advancement to the construction stage.

AGC scholarship awards

Five University of Minnesota civil engineering students were named as recipients of \$300 scholarship awards made by the Associated General Contractors of Minnesota (AGC), announced Mr. Ray V. Johnson, Winston Bros. Company, president of the association. The students were selected for the awards on the basis of their academic aptitude, their vocational promise, leadership, character, and other qualifications.

Dr. Lorenz G. Straub, director and head of the University of Minnesota's Hydraulics Laboratory, introduced the scholarship recipients and spoke on engineering education at the Minnesota AGC's 37th Annual Convention.

VICKERS INCORPORATED PROMOTIONS. M. J. Taup, formerly manager of Mobile products sales, has been appointed administrative assistant to the vice-president of Vickers Incorporated, Detroit, Mich. A. M. Lane, heretofore midwest regional manager, succeeds Mr. Taup.



CIVIL ENGINEERS



Work and live in wonderful WISCONSIN

A rapidly expanding highway program offers:

Permanent civil service positions
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Challenging work

Starting salary based on experience

Civil engineering degree or professional registration required

Write to:

Personnel Officer
State Highway Commission of Wisconsin
State Office Building
Madison 2, Wisconsin

... for more details circle 273, page 16



PORTABLE ASPHALT PLANT

MODEL L-8, 10-15 TON CAPACITY

A COMPLETE ASPHALT PLANT ON ONE CHASSIS... DRYER, MIXER, HEATING KETTLE. Low in cost, small enough to tow, BIG enough to produce HOT mix, (or any other bituminous mix) for driveways, parking lots, street maintenance, etc. Equipped with 50 HP LeRoi engine, air operated gates for one man control, divided compartment, reciprocating feeder for proportioning aggregate. Available as stationary plant with 30 HP electric motor.

Write for catalog and name of nearest dealer.

White



Stationary Plants L-12 and L-25, 15-30 ton capacity.

White

ELKHART 20, INDIANA

... for more details circle 272, page 16

Strike-Off Blade for Tamping Rollers

A level blade attachment to fit Bros M2 series tamping rollers, and soon to be available for the G2 series, has been announced by Wm. Bros Boiler & Mfg. Co., 1057 Tenth Ave., S.E., Minneapolis 14, Minn. By mounting directly in front of the tamping roller, it levels off the road fill, stated to result in more even compaction over the entire area of the lift covered by the roller.

The blade has a 7½ in. vertical adjustment controlled from the operator's seat, which allows lowering to 5 in. below the drum surface. Raising and lowering movements are made by the tractor hydraulic system through simple take-off connec-



Strike-Off Blade on Tamping Roller

tions, or, they can be cable controlled. An optional hydraulic system is available to supply hydraulic control independently, if desired.

Seventeen inches high by 112 in. wide, the blade has a ½ in. x 6 in. high carbon steel reversible cutting edge which is replaceable when worn. The attachment replaces the towing tongue on present Bros rollers, and has a total weight of 1750 lb.

For more information circle 126 on Service Coupon Page 16 and mail now.

Tractor Loader Has Dozer Blade

An entirely new and thoroughly tested Hefti loader for IHC-300 utility tractor has been announced by Henderson Manufacturing Co., Cedar Rapids, Iowa. A heavy duty dozer blade and a utility bucket team up with the loader and the tractor to form a compact, rugged piece of equipment. The blade and bucket can be mounted interchangeable on either front or rear of loader.

The loader is the new slip-on design, easily mounted, as the main axle bracket allows easy-on-and-off mounting. Side mount framing permits easy step-on and off.



Hefti Loader

The Hefti loader is interchangeable between makes of tractors, as it not only fits the IHC-300 Utility, but also the Oliver Super 55 and others, with only a small bracket change.

The bucket has ½ cu. yd. struck capacity, with lifting height of 8¾ ft. from ground to tripped scoop tip.

Lifting capacity is 2000 lb., and depth of cut below ground for both bucket and dozer is 9½ in. Dozer is 6 ft. angling blade.

For more information circle 127 on Service Coupon Page 16 and mail now.

Dual Purpose Concrete Tester

Compression tests of either concrete blocks or cylinders can be made right on location with a new portable Olsen testing machine. Weighing only 285 lb., this machine has capacity of 200,000 lb. compression load. The load is applied by hy-

draulic pressure developed by movement of a lever. The applied load is indicated directly on a large hydraulic gauge mounted on top of the unit.

Made to accommodate standard 9 in. by 9 in. or 8 in. by 16 in. concrete blocks, this versatile tester can also be used for testing standard 6 in. by 12 in. concrete cylinders with equal facility.

This new Olsen unit provides much needed flexibility. Previously two separate units were required to test both blocks and cylinders. Information is available upon request to Tinius Olsen Testing Machine Co., 5145 Easton Road, Willow Grove, Pa.

For more information circle 128 on Service Coupon Page 16 and mail now.



Moto-Paver is More Flexible—More Adaptable

say these County Road Engineers

In all parts of the country—on all kinds of roads and all types of terrain—Moto-Paver is daily proving its flexibility and adaptability in maintaining and resurfacing roads and streets.

Harry D. Martin, road engineer of Cowlitz County, Wash., says: "The biggest advantage of the Moto-Paver is its flexibility. We can raise or lower a crown, and raise or lower either shoulder."

L. S. Matthews, engineer of Pacific County, Wash., says: "We have found the Moto-Paver more adaptable in placing road mix mats over the conventional method of blade mixing. We also get a more uniform percentage of bituminous cement in the mat, plus a higher grade of asphalt."

Moto-Paver does the complete mixing and laying job—in one continuous operation. Mixing capacity on resurfacing work is 100 to 120 tons per hour. On stabilization jobs, greater capacities can be obtained. The machine can be moved quickly from one job to another—under its own power.

Ask your H & B distributor or write direct for new bulletin MP-55.

Hetherington & Berner Inc.
721 Kentucky Ave., Indianapolis 7, Indiana

... for more details circle 218, page 16



Truck dumping aggregate into forward hopper of Moto-Paver. Aggregate can also be picked up from windrow, using an H & B Loader.



Leaving an even layer of mixture behind, a Moto-Paver moves along a county road. Paving speeds are infinitely variable from a minimum of 2 ft. per minute. Road speeds up to 25 mph.

Manufacturers' Literature

Soil Sampling Tools

A complete line of soil sampling tools, diamond and short core drills, and drilling accessories and equipment is covered in Bulletin No. 25, available from Acker Drill Co., Inc., 725 W. Lackawanna Ave., Scranton, Pa. The 16-page bulletin contains 69 illustrations and descriptions of Acker products.

For more information circle 129 on Service Coupon Page 16 and mail now.

Multi-Blade Road Planer

The "Double M" road planer and leveller is illustrated and described in a 4-page circular issued by Jude Molene Co., Inc., 1508 26th St., Des Moines, Iowa. This unit will fit any motor patrol by removing mold board and fastening to circle arms. It has four 7 ft., two 5 ft. and two 6 ft. blades. Seventy-five counties in Iowa, have from 1 to 12 of these units.

For more information circle 130 on Service Coupon Page 16 and mail now.

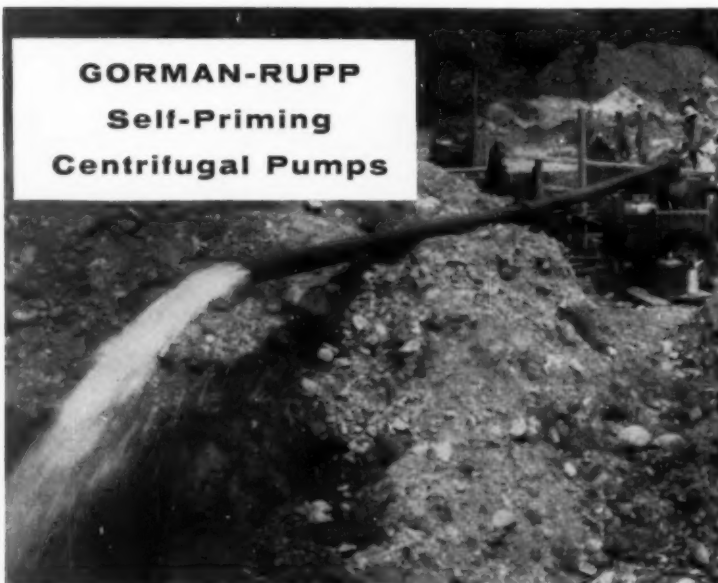
Crawler Tractors in Construction Field

"The Crawler . . . Backbone of Con-

struction," a new 12-page booklet published by American Tractor Corp., Churubusco (Ft. Wayne), Ind., graphically illustrates how and where the company's 30 to 60 hp TerraTrac tractors fit in the construction picture. Among the many illustrations in the 3-color booklet are pictures of TerraTrac's complete line for 1956. Five new gasoline and three diesel-powered tractors are featured — plus a complete selection of matching loaders, dozers, backhoes, scarifiers, winches, etc.; a materials-handling fork lift; and two tilt-loading trailers. Information is also included on TerraTrac's exclusive torque converter drive and revolutionary hydraulic power-shifting transmission, which are being introduced for the first time in the low-priced crawler field. A detailed chart compares operating features of leading makes of 1 cu. yd. crawler-loaders.

For more information circle 131 on Service Coupon Page 16 and mail now.

GORMAN-RUPP Self-Priming Centrifugal Pumps



PETER KIEWIT SONS' COMPANY rely on Gorman-Rupp Pumps to handle Charles River seepage on relief sewer project near Boston.

DEWATERING INSURANCE

Work must go on. It *does* with Gorman-Rupp Pumps on the job. They pump out water, dry out excavations fast. In fact, Gorman-Rupp guarantees its pumps to handle more dirty water more hours, using less gasoline and to prime quicker than any other self-priming pumps of similar size.

Engine- and motor-driven pumps available from 1½", 5850 G. P. H. to 10", 240,000 G. P. H. capacities. Ask for bulletin 8-CP-11.



Model 36A-JF, on above project, has an A. G. C. rating of 90,000 G. P. H. at 25' TDH.



THE GORMAN-RUPP COMPANY
305 Bowman St., Mansfield, Ohio

. . . for more details circle 214, page 16

Self-Propelled Line Marker

A new bulletin covering the M-B Line-Master, a new low-cost self propelled line marker, issued by M-B Corporation, New Holstein, Wis., gives specifications for the marker and explains in detail the features of the unit, including automotive steering, shift-o-matic drive, the large paint capacity and the features of single, double or intermittent marking. Descriptions of other M-B line marking equipment are also included in the booklet.

For more information circle 132 on Service Coupon Page 16 and mail now.

Oriented Diamond Bits

A new 16-page catalog, No. 320.1, offered by Sprague & Henwood, 221 West Olive St., Scranton, Pa., illustrates and describes all types of oriented diamond coring bits, non-coring bits, casing bits, casing shoe bits, reaming shells, impregnated coring bits, etc. Described in detail is the story of orienting drilling bort in diamond bits, initiated by Sprague & Henwood in close cooperation with the United States Bureau of Mines.

For more information circle 133 on Service Coupon Page 16 and mail now.

102 and 140 H. P. Motor Graders

A 16-page bulletin and complete specification sheets on its two new motor graders — the 102 hp 6-D and 140 hp 7-D are available from Huber-Warco Co., Marion, Ohio. Bulletin No. HWG-521 covers outstanding features of both machines which are similar in design. Two-page spreads illustrate such common features as "Heavy-Duty Construction," "A New Meaning in Power (Top-Performing Diesels . . . Torque Converter . . . Power Shift Transmission)," "Complete Cab-Controlled Movement of the Blade," and "Power Sliding Moldboard Is Standard." Single page layouts explain other outstanding features and optional equipment. Another section features photos of the 6-D and 7-D in action and the back cover pictures the complete line of

Huber-Warco road machinery including three-wheel rollers, tandem rollers, motor graders and the Huber-Warco Maintainer.

For more information circle 134 on Service Coupon Page 16 and mail now.

Portable Hydraulic Earth Borer

How to dig holes easily and rapidly is the subject of a new catalog on the Holan 4401-H portable hydraulic earth borer, available from J. H. Holan Corp., 4105 West 150th St., Cleveland 11, Ohio. The 4-page catalog has line sketches, close-up views of construction and action pictures of the new Holan digger. The unit bores holes 8 in. to 20 in. diameter and up to 8 ft. deep. A variety of cutter heads is available.

For more information circle 135 on Service Coupon Page 16 and mail now.

Concrete Vibrator, Screed, Grinders

Concrete vibrators, portable concrete grinders, vibrating screeds, and rotary trowels are illustrated in a new 16-page catalog, No. 560, issued by Stow Manufacturing Co., 65 Sheer St., Binghamton, N.Y. Catalog gives complete information and specifications on Stow's complete line of gasoline and universal electric vibrators. Also shown are Stow's new portable concrete grinders along with a list of accessories and attachments. Four different size Roto-Trowels are shown from 24 in. to 46 in. in diameter. Specifications are given on Stow's vibrating screeds, including directions on how to build your own vibrating screed beam.

For more information circle 136 on Service Coupon Page 16 and mail now.

Cold Asphalt Emulsions for Hot-Mix Pavements

A new 4-page, illustrated bulletin, issued by American Bitumuls & Asphalt Co., 200 Bush St., San Francisco, Calif., provides detailed information on Laykold asphaltic concrete and Bit-U-Mix paving mixtures for all types of road construction. Laykold asphaltic concrete uses tempering fluid with asphalt cement for maximum workability of mix and longer pavement life; Bit-U-Mix combines Bitumuls emulsified asphalt with hot aggregate to eliminate necessity of heating binder and to improve general workability. Both types are manufactured in any standard hot-mix paving plant.

For more information circle 137 on Service Coupon Page 16 and mail now.

Field Engineering Equipment

A new 32-page catalog released by the Frederick Post Co., 3666 N. Avondale Ave., Chicago 14, Ill., features a wide selection of equipment and supplies for field engineering. Transits, levels, range poles and leveling rods, measuring tapes, field books, and all related accessories are described and illustrated in detail. Well known brand names, Post, Berger,

Bostrom, David White, Lufkin, Chicago, Taylor, Bausch and Lomb are listed.

For more information circle 138 on Service Coupon Page 16 and mail now.

Motor Graders

The design, engineering, construction and performance story of the Allis-Chalmers 50 hp., Model D motor graders are comprehensively told in the new 16-page, two-color catalog (MS-459), available from the Construction Machinery Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Cut-aways, photographs of components, combustion graphs, and other illustrations combine to help the

reader visualize features of both the gasoline and diesel engine Model D motor graders. Photographs also show the many features that assure operator comfort and safety. Matched attachments and accessories that add to year-round versatility of the Model D are also shown, and specifications of both the gasoline and diesel engine models are included.

For more information circle 139 on Service Coupon Page 16 and mail now.

Power-Lift Hydraulic Tail Gates

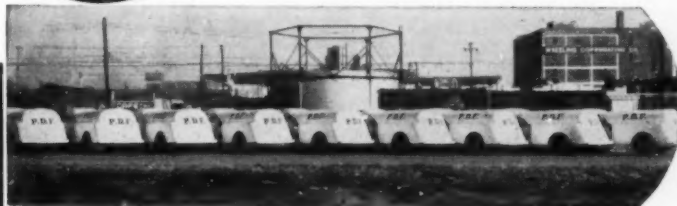
Models H-20 and H-30 Load-N-Gate power-lift hydraulic tail-gates are de-

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EQUIPMENT



Standard Steel Works, Inc. NORTH KANSAS CITY, MO.

FL-4

. . . for more details circle 258, page 16

scribed in a new 2-page catalog (No. 152), issued by Hercules Steel Products Co., Gallon, Ohio. The new 2-color catalog covers both 2000 and 3000 lb. capacity power take-off models. Construction, operation and controls are fully described and illustrated. Condensed specifications are also shown.

For more information circle 140 on Service Coupon Page 16 and mail now.

Low-Bed Trailers

A new detailed catalog and a series of informative bulletins, available from Talbert Trailers, Inc., 7950 West 47th St., Lyons, Ill., covers the Talbert line of low-bed trailers, tilt and flat deck auxiliary trailers, and pole trailers. It shows the step-by-step loading and unloading ease of Talbert trailers equipped with the patented removable gooseneck. It covers the details surrounding Talbert's spring suspension, three axle suspension, and trunnion suspension units as well as an analysis of Talbert's "built-for-any-job" frame construction. Helpful specification listings and model illustrations are also included to cover the full range of Talbert trailers from 10 to 100-tons capacity.

For more information circle 141 on Service Coupon Page 16 and mail now.

New Development in Outdoor Lighting

A catalog on LUXaire (R), a new development in outdoor fluorescent light-

ing, is offered by Pfaff & Kendall, 84 Foundry St., Newark 5, N.J. The catalog illustrates actual installations, provides engineering information, and suggests more than a dozen special applications for lighting areas, entrances, bridges, tunnels, garages, etc. LUXaire is said to produce from three to five times the amount of light per watt over incandescent lamps, with true color retention and long lamp life.

For more information circle 142 on Service Coupon Page 16 and mail now.

Black Top Maintenance and Construction Equipment

A revised, highly informative 36-page Catalog (CG) "Black Top Road Maintenance and Construction Equipment," covering the field of highway and road maintenance equipment, has been announced by Littleford Bros., Inc., Box 75, 454 East Pearl St., Cincinnati 2, Ohio. Units described and illustrated include Littleford's engineered pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, heater-planer, rollers, and accessory tools.

For more information circle 143 on Service Coupon Page 16 and mail now.

Truck Mixer

A new pictorially illustrated 16-page bulletin on Hi-Up truck mixers has been issued by Worthington Corporation.

Based on the company's new Mixer-

ama program, the new bulletin in effect, takes the reader on a round-trip tour of a Hi-Up truck mixer. Information is presented on easy accessibility features which permits the operator to control the direction of drum rotation and engine speed from the cab. A series of nine pictures illustrate accessibility features by showing each angle of a Hi-Up truck mixer and the various component parts. Maximum legal payload and truck mixer weight data are included along with information on correct design features for uniform mixing and rapid, clean discharge. Cutaway photographs illustrate features of input shaft, gear train, clutches, output shaft and drum driving chain. Similar cutaway views reveal transmission, brake, bearings and chain adjustment assembly. Detailed information describes the Hi-Up two-compartment tank design and photographs illustrate the interior of the mechanism-free tank. Interchangeability of parts and maintenance information are included along with a picture series section on general operation.

For further information or copies address requests to Worthington Corporation, Advertising & Sales Promotion Department, Harrison, N.J., specifying Bulletin #1260-B1A-P.

For more information circle 144 on Service Coupon Page 16 and mail now.

New 25-Ton Lorain Moto-Cranes

A new 2-color catalog describing two new 25-ton Lorain Moto Cranes, Models MC-425 and MC-425W, has been published by The Thew Shovel Co., Lorain, Ohio. The MC-425 is 96 in. wide; the alternate Model MC-425W, is 108 in. wide to permit developing greater lifting capacities without the use of outriggers. The publication contains descriptions of several new features, plus views of the Moto Cranes in action. Among the new developments on these machines are the availability of a revolutionary "Shear Ball" mounting that eliminates all turntable rollers, center pins and centering gudgeons with their constant maintenance and adjustment; a crane boom with main chords of square tubular cross section that develop greater strength and lifting capacities at reduced weight; a three position turntable mounting for maximum efficiency when used as a heavy-duty crane, general purpose crane, or for shovel, hoe and dragline service; a removable counterweight to reduce the over-all weight of the vehicle for highway travel, and the availability of dual remote controls for carrier operation as a self-propelled crane from the turntable cab. A special 8x4 carrier mounting is also available for the new models. This provides 2 front axles for increased flotation on soft-ground travel.

For more information circle 145 on Service Coupon Page 16 and mail now.

Safety Hoist Hooks

A new 4-page catalog, covering new lines of safety hooks is available from E. D. Bullard Co., 275 Eighth St., San

OVERMAN STONE AND BITUMINOUS SPREADER



They use 'em everywhere!

... **IN THE HEART OF TEXAS** — where big people do things in a big way, the Overman Spreader proves its ability to uphold the Texas tradition — it does its work in a big way. While it is a small, compact machine, you will find it equal to the job, no matter how large. Yet it can easily be towed between jobs, and maneuvered into place on small driveways and parking lots.

For speed, economy, performance you just can't beat it.

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BULLETIN
TODAY

I. J. Overman Mfg. Co.
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... for more details circle 245, page 16

Francisco, Calif. It contains photographs of hooks and connectors, each accompanied by a full explanation of their uses on hoists and cranes. The data covers types "A" to type "S" for hooks ranging from the No. 1 with a safe working load of 1000 lb., through No. 16A with a safe working load of 50,000 lb., and utility hooks for use with "hot line tools" and equipment. In addition to this, it gives the safe working load of all B-B safety hooks, throat opening, shank diameter, shank remaining above the gate and the bail or eye nut size.

For more information circle 146 on Service Coupon Page 16 and mail now.

Oil Controls for Bearing Lubrication

A new and completely illustrated 4-page circular, describing its line of "Alvor" constant level oil controls; bottle oilers for plain bearing lubrication; "Sentinel," "Royal" and "Pioneer" glass body oil cups; and "Alsen" aluminum body oil cups, has been prepared by Lunkenheimer Co., P.O. Box 360, Cincinnati 14, Ohio. The circular includes detailed dimensions and installation instructions covering a wide range of applications.

For more information circle 147 on Service Coupon Page 16 and mail now.

Feeder Feeds and Scalps in One Operation

The Universal Wobbler feeder is illustrated and described in a 6-page folder

issued by Universal Engineering Corp., 625 C Ave., N.W., Cedar Rapids, Iowa. The Wobbler feeder performs the dual function of feeding and screening in one operation. The Wobbler bed, composed of ten elliptical-shaped manganese steel bars, imparts a rocking, tumbling motion to materials as they are feed to the jaw. Fines are thoroughly cleaned from the oversize and drawn off. Self-cleaning Wobbler bars are stated to guarantee separation of fines from oversize in the wettest or stickiest of materials. Wobbler bar openings run from $\frac{1}{8}$ in. through $1\frac{1}{2}$ in. in $\frac{1}{8}$ in. increments.

For more information circle 148 on Service Coupon Page 16 and mail now.

The car — the traffic — the road

Three papers presented at the Thirty-Fourth Annual Meeting of the Highway Research Board in January 1955:

1. "Operating Characteristics of a Passenger Car on Selected Routes," by Carl C. Saal, discusses certain operating characteristics of a typical 1951-model passenger car, including amount of time operated in various class intervals of speed, rate of deceleration, percentage of maximum intake manifold vacuum, percentage of throttle opening, fuel consumption, and other related characteristics.

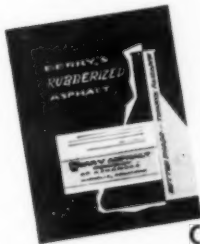
The test car was operated on 28,000 miles of highway during 1951 and 1952. Included were studies on high-speed freeways and parallel major highways and studies related to traffic signals, sight distances, grade separations, and various traffic conditions.

2. "Analysis of Flow on an Urban Thoroughfare," by Roy H. Fielding and Thomas E. Young, describes changes made in traffic control on Reading Road, Cincinnati and a study of the effects of these changes in terms of traffic volumes, capacity, accident records, delays and operating speeds, and on certain operating characteristics of motor vehicles.

3. "Economics of Operation on Limited-Access Highways," by A. D. May, reports the findings of twelve case studies in which a comparison of operations was made on two abutting or nearby sections, one having limited access and one nonlimited access. Travel time, gasoline consumption, utilization of brakes, and safety were investigated.

"Vehicle Operation as Affected by Traffic Control and Highway Type," BULLETIN 107, Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., July, 1955. (Price 90 cents). The first of the above three papers was reprinted with some modifications in PUBLIC ROADS, August, 1955.

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... for more details circle 278, page 16

ROADS AND STREETS, April, 1956

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"LUBRIPLATE Lubricants satisfy the 'one-shot' requirements of our conveyor idlers. LUBRIPLATE effectively lubricates each bearing in turn and flows through the hollow shaft to the next bearing. We do not know of a single case of bearing trouble through faulty lubrication where LUBRIPLATE has been used."

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... for more details circle 235, page 16

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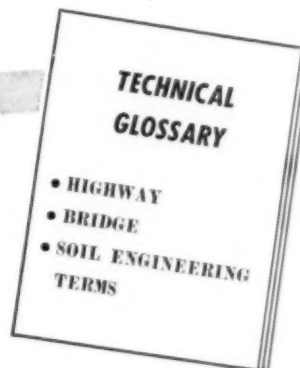
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TECHNICAL GLOSSARY is a much needed work for use in translating English technical material into Spanish, or Spanish technical material into English, in order to convey the exact same idea and meaning to the reader of either language.

THIS BOOK was in process of preparation for a period of fifteen years. The preparation cost was in excess of \$45,000.

The need of a specific glossary or dictionary of terms of this type has long been felt. After several International conferences between representatives of the U. S. Bureau of Public Roads and Latin American engi-

neers, a decision was reached to prepare such a glossary. To further extend its usefulness, soil stabilization and associated laboratory work was included.

The manuscript for this book of over 35,000 terms was over 15 years in preparation under E. W. James, then Chief, Inter-American Regional Office, U. S. Bureau of Public Roads, working with the Library of Congress of the United States. It has been approved by a committee of five bilingual engineers of the Mexican government under the chairmanship of Sr. Ing. J. Fco. Rodríguez Cabo. It was then submitted to and approved by the "Academia Mexicana Correspondiente de la Academia Real Española" under the chairmanship of Sr. Don Martín Luis Guzmán, distinguished author, editor and publicist, also publisher of "El Tiempo."

It was then submitted to the V Pan American Highway Congress where a resolution was adopted commending the venture and recommending that the manuscript be published.

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Caterpillar 12 Grader, 7T series	4,000.00
A.C. HD20 Bulldozer	7,500.00
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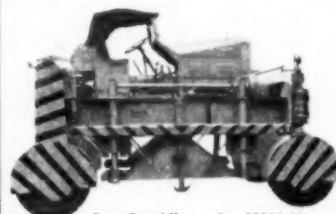
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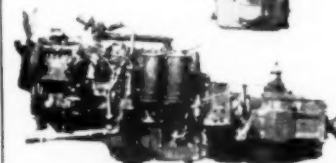
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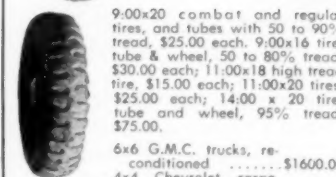
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Maginnis concrete vibrator for 25 ft. width — full depth of slab with 10 vibrator units.

1350 ft. — 17"x14" dual purpose paving forms.

These units used on only one job.

Excellent condition.

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Go Corp Jr. Twin Concrete Block Machine — practically new — has made less than 400,000 blocks — also 13,885 pallets and 60 racks — \$10,000.00

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 1100-20 Heavy Duty Good Condition. 35.00
 1100-22 Heavy Duty Good Condition. 25.00
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Everyone Saves at BARONS
 All types of heavy work tires. Excellent condition.

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1951 Super C Tournadozer. GMC 671 diesel. Straight blade never used. Condition NEW. \$10,000

B-E 37B #24519, Cat D-13000 diesel used 1800 hours. With 1 1/2 yard shovel front. \$17,000

LinkBelt LS-85 #7513 with Chrysler Industrial 8 motor. Any attachment you want. UNUSED \$12,000

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Koehring 205 Cruiser Crane #C-4100 with 32' boom, 15 ton capacity. 10.00x20 Pneumatic tires. \$8750

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Serials 809-808-804 with Cummins Engines. Good working condition. F.O.B. our lot St. Louis, Missouri. Price each, \$15,000.00. For photos and further information contact:

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2 LeTourneau Model LS Scrapers.

1 Mack B-60T Truck Tractor, 1954, SN 2085.

1 Rogers T-25-L Equipment Trailer, SN 6308 — 1954.

All equipment in excellent condition—working every day. Will sell separately—a real deal on whole group.

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Increase Production as much as 30% over dry wheezy overheated tools. Can be used to mix antifreeze with air to prevent icing of tools in winter. Easily installed on receiver tank or air or steam line. Standard pipe thread fittings. Minimize repairs on all tools from a small tamper to the largest pile hammer or tractor.



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25% Discount on orders of 6 or more

Model	cu. ft. per min.	Price
#5	85 to 105	\$38.00
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25 ton Whitecomb Diesel Locomotive 1949.
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 140 hp Christian 2D Diesel Hoist & Swinger.
 10 ton Unit #1020 Mobile Motor Crane.
 25 ton Amer. Diesel Locomotive Crane.
 25 ton American Steel Guy Derrick.
 30 ton steel Stiffleg Derrick & Hoist.
 1 1/2 yd. Manitowoc 2000B Diesel Crane 1948.
 2 1/2 yd. Manitowoc 3500 Diesel Crane 1948.
 3 1/2 yd. Lima 1201 Shovel-Dragline.
 5 yd. P&H 1400 Diesel Shovel 1950.
 2200 CFM C-P OCE Air Compr. 350 hp.

Mississippi Valley Equipment Co.

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 PIONEER Washing Plant**

Portable — Like New

Model 300-WA #3106 with 58 pieces 6" water pipe; Jaeger 6" centrifugal pump; Eagle Twin screw sand classifier & extra screens Price: \$24,000 fob Cleveland, Ohio. Barber-Greene 60' portable conveyor \$2,000; 2 Farquhar trough conveyors 80' long by 24" wide, \$2,500 each.

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With the Manufacturers and Distributors

DARLING MADE ASSISTANT VICE-PRESIDENT. L. W. Darling, formerly manager of government sales for Davey Compressor Co., Kent, Ohio, has been appointed assistant vice-president. He will be located at the Kent, Ohio plant, and will direct activities of 12 district offices and more than 150 direct factory distributors.

THREE NEW LIMA DISTRIBUTORS. Three distributor appointments for Lima shovels, cranes, draglines and pull shovels have been announced by Baldwin-Lima-Hamilton Corporation, Construction Equipment Division, Lima, Ohio. Mineco

Incorporated, Bartow, Fla., will cover central portions of Florida; Southern Equipment Sales, Inc., 980 South State St., Jackson, Miss., will cover southern half of Mississippi, and Hall-Perry Machinery Co., Butte, Mont., has been assigned entire state of Montana with exceptions of Lincoln, Mineral and Sanders Counties.

THOR FORMS CONSTRUCTION EQUIPMENT DIVISION. A construction equipment division has been formed by Thor Power Tool Co., Aurora, Ill., and will begin its activities at once. Named to head the new division are William J. Miller and Elmer R. Stitt, former president and vice-president of the Master Vibrator Co., Dayton, Ohio, who will establish headquarters at Thor's main works at Aurora. They will be joined in their new affiliation by W. C. Nussbaum

and Paul Devoe, former engineers at Master Vibrator Co., who will be placed in charge of new product design and development. Purpose of the new division is to set up an autonomous unit within the company to concentrate on development, production and sales of equipment for the construction industry to supplement the company's present line of air and electric tools for contractors.

M-H-F TO MARKET INDUSTRIAL WHEEL TRACTORS. A new Industrial Division has been established by Massey-Harris-Ferguson, Inc., Racine, Wis. to market a full line of light and medium-duty industrial wheel tractors and allied equipment. B. R. Bermann, formerly general service manager of the Ferguson division, has been named sales manager of the new M-H-F industrial division. Present schedules call for the tractors to start rolling off production lines late in March. Supplementing them will be a full complement of allied equipment to include loaders, back hoes and lift forks to dozer blades, trenchers and mowers.

NEW PIONEER DISTRICT REPRESENTATIVE. Robert J. Johnson has been named as a new district representative of Pioneer Engineering Works, Inc., Minneapolis, Minn., subsidiary of Poor & Company, Chicago. His territory will include the states of New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, Maine, New Jersey, that part of Pennsylvania served by Serv-



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Swenson Spreader & Mfg. Co.
Lindenwood, Illinois

Speed Sealcoating Jobs
with
SWENSON SPREADERS

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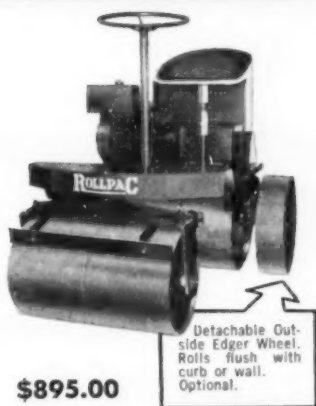
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Detachable Outside Edge Wheel. Rolls flush with curb or wall. Optional.

A Standout Popular-Priced One Ton Roller. Send for Catalog.

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Sold by over 95 distributors in United States and Canada
... for more details circle 251, page 16



KAHN'S
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PRIME STRIP STEAKS

Cut New York Style from Prime Beef, these superb Sirloins are seldom found outside the finest hotels and restaurants. Now, in response to many requests, Kahn's AMERICAN BEAUTY Strip Steaks are available to you the year 'round. U. S. Government inspected. Every steak comes from a selected steer, corn-fed for nearly a year in the lush Ohio Valley. Slow, natural aging in our Steak-Aging Room gives an extra tenderness, extra juiciness, incomparable flavor. An epicure's delight!

Box of 8, weight 14 oz. each (fewer of 16, 18, or 20-oz. steaks if specified), packed in dry ice, shipped prepaid in U. S. east of the Mississippi \$25.

(West of the Mississippi, via Air Express \$33.50)

Kahn's AMERICAN BEAUTY SKINLESS SHANKLESS HAM—"The Heart of the Ham," 10-12 lb. average. Prepaid in U. S. \$14.95

Enclose and send check or M. O. Order now to enjoy the outdoor cooking season.

Kahn's

OHIO VALLEY SMOKEHOUSE

Dept. R, 3241 Spring Grove Ave., Cincinnati 25, Ohio

... for more details circle 275, page 16

ROADS AND STREETS, April, 1956

ice Supply Company of Philadelphia, and the Canadian provinces of Quebec, New Brunswick and Nova Scotia.

FLORIDA SALES REPRESENTATIVE APPOINTED. D. F. Gosheff has been appointed sales representative of Detroit Diesel Division of General Motors — Florida branch. Mr. Gosheff will coordinate the diesel sales activities of Florida marine and industrial dealers with operations at Detroit Diesel branch headquarters at Miami and the sub-branch at Jacksonville. In Jacksonville he will work with Roy Kuhns, who is manager of that operation.

SMITH NEW SCHRAMM DEALER SALES MANAGER. Leslie B. Schramm, sales manager of Schramm, Inc., Westchester, Pa., has announced the appointment of P. F. Smith, IV, as dealer sales manager; Joseph E. McGrogan continues as regional sales manager in charge of Southern and Central territories; Arno O. Witt continues as manager of Canadian and export business; John P. Powell becomes regional sales manager of Eastern territories; and Donald M. Thomson continues as western sales manager with headquarters in San Francisco, Calif.

NEW DISTRIBUTORS FOR MICHIGAN LINE. The following new distributors have been appointed to sell and service the Michigan line of tractor shovels and excavator cranes, products of the Construction Machinery Division of Clark Equipment Co., Benton Harbor, Mich.: Mainline Equipment Co., Inc., 818 S.W. Ninth St., Des Moines, Iowa; R. A. Young & Son, Inc., 301 South Tenth St., Fort Smith, Ark.

BERT ROYCE RETURNS TO DITCHER FIELD. Bert Royce, who in the early part of the century introduced the mechanical ditcher to hundreds of contractors throughout the U. S., is now back in the field again, representing Gar Wood-Buckeye, manufacturer of the world's first ditching machines. Starting his 46th year with Gar Wood-Buckeye, Bert will be calling on old friends in the South and Southwestern parts of the country.

NAAB APPOINTED MANAGER. George A. Naab has been appointed manager of Pneumatic and Electric Equipment Co. (PEECO), Philadelphia, Pa., succeeding P. F. Smith who resigned to accept a position as dealer sales manager of Schramm, Inc., West Chester, Pa.

NEW MICHIGAN LINE DISTRIBUTOR. Merts' Equipment Co., 300 Slappey Drive, Albany, Ga., has been appointed distributor of the Michigan line of tractor shovels and excavator cranes, products of Construction Machinery Division, Clark Equipment Co., Benton Harbor,

Mich. The dealer will handle Georgia counties south of, and including, Chattahoochee, Marion, Schley, Macon, Dooly, Pulaski, Dodge, Wheeler, Montgomery, Toombs, Tattnall, Evans, Appling, Pierce, Brantley and Charlton.

NEW BUCYRUS-ERIE DISTRIBUTOR. Ohlert Tractor & Equipment Co., Inc., 201 West Pacific Ct., Salina, Kan., has been appointed as distributor for Northwest sections of Kansas, for Bucyrus-Erie Co., South Milwaukee, Wis.

YOUR OPPORTUNITY!



UNUSED Army Trucks
2 1/2, 3 1/2, 6-ton

GMC-DIAMOND T & INTERNATIONAL 6x6's

- From Government Storage!
- Unused and Guaranteed!
- Factory-New Condition!
- Delivered on Approval!
- Reconditioned Trucks Also Available!

Tandem axle trucks with front wheel drive, 10 forward speeds, overdrive, brand-new mud and snow tires. Carry maximum loads, give extra power you need in "rough going" ... at LESS, often half the COST of conventional new trucks.

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Sales Manager

MEMPHIS EQUIPMENT Company
CONSTRUCTION AND AUTOMOTIVE EQUIPMENT AND PARTS
766 SO. THIRD ST. MEMPHIS, TENNESSEE

... for more details circle 241, page 16

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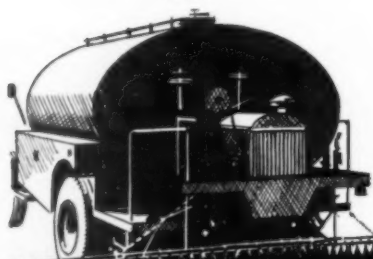
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meets many diverse requirements when incorporated into formulations at a low 0.6 to 1.5% of the total weight. It is physically and chemically compatible with all emulsifiers, particularly the resin acid soaps most often used. It stabilizes asphalts from any petroleum source, works with aggregates from all parts of the country.

INDULIN C

is stable to deterioration on storage or standing — and to temperature extremes. It will not lump under moist conditions. It has low ash content.

One good answer to emulsion stabilizing problems seems to be INDULIN C. Request Bulletin 101, and formulation assistance from our laboratory staff.

Polychemicals
DIVISION

West Virginia Pulp
and Paper Company

CHARLESTON 4, SOUTH CAROLINA

... for more details circle 270, page 16

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HARNISCHFEGER APPOINTS DISTRICT MANAGERS. E. J. Sullivan has been appointed district manager of the Denver office of Harnischfeger Corporation, Milwaukee, Wis. William H. DeHuff has been appointed district manager of the San Francisco office. Sullivan, who has been with Harnischfeger's Denver office since July of 1950, succeeded DeHuff, upon the latter's transfer to San Francisco. DeHuff, with Harnischfeger since 1950, takes over the new post upon the retirement from active service of L. M. Stout, who has managed the P&H San Francisco office since 1947.

EUCLID APPOINTS REGIONAL SALES MANAGERS. J. W. Bloomquist, domestic sales manager of Euclid Division, General Motors Corporation, Cleveland, Ohio, has announced the appointment of regional sales managers in charge of Euclid product distribution and policy administration. Eastern regional manager is John A. Polhemus with offices in New York City. J. E. Ehler, with offices in Cleveland, is manager of the home office district. E. C. Dellen is central regional manager with offices in Kansas City, Mo. C. B. Pace, with offices in Atlanta, Ga., is manager of the Southern region. R. M. Brown is manager of the Hibbing, Minn. branch. M. H. Johnson, with offices in Oakland, Calif., is western regional manager.

ANDERSON PURCHASES LESSMANN MFG. CO. A. C. Anderson, Inc., Wildwood, N.J., manufacturers of Anderson mowers and front end loaders, Imp. dozers and other tractor attachments, has purchased plant and assets of Lessmann Manufacturing Co., Des Moines, Iowa. This plant will provide additional facilities for Anderson equipment. Headquarters of A. C. Anderson, Inc., will remain in Wildwood, N.J.

NEW GALION ALLSTEEL DISTRIBUTOR. Brown-Clark Equipment Co., Inc., 1905 Chamberlayne Ave., Richmond, Va., has been appointed distributor in central and western Virginia for products of Galion Allsteel Body Co., Galion, Ohio.

RADEBAUGH APPOINTED SALES PROMOTION MANAGER. D. W. Radebaugh, formerly sales engineer, Automotive and Tractor Sales Division, has been appointed sales promotion manager of Detroit Diesel Engine Division of General Motors Corporation, Detroit, Mich. He succeeds T. L. Guerniere, recently made merchandising manager.

WIGNALL NAMED PARTS AND SERVICE MANAGER. Herbert Wignall has been named parts and service manager of Link-Belt Speeder Corporation, Cedar Rapids, Iowa. Wignall, who has been affiliated with the company over the past ten years, will also supervise the training of all distributor and future factory servicemen.

HOOGSTRA ELECTED VICE-PRESIDENT. E. W. Hoogstra, manager of sales and

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This White 18" Dumpy level has
... more of the
features you want,
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Before you buy, compare this White Dumpy level with a similar model of any other recognized make. From every standpoint — design detail ... quality construction ... work-speeding, life-lengthening features and cost — you'll quickly see why a White's the best buy you can make. It will make your work faster, easier, more accurate. Check this comparison chart:

FEATURES	D. White No. 7080	Instrument	
		A	B
Magnifying power of telescope	35X	30X	27X
Distance away you can read 1/100 ft. graduation	1200 ft.	1050 ft.	900 ft.
Diameter of objective lens	1.81 in.	1.485 in.	1.69 in.
Field of view (in minutes of arc)	64'	52'	60'
Coated optics	YES	YES	YES
Covered leveling screws	YES	YES	YES
Can you easily replace worn leveling screws in the field?	YES	NO	YES
Sensitivity of level vial (in seconds of arc per 2mm of graduation)	20"	20"	25"
Price — complete with carrying case, tripod and accessories — F.O.B. factory	\$305.00*	higher	higher

For complete details on the 18-in. Dumpy level and other equally fine engineering instruments, see your David White dealer, or write direct to DAVID WHITE CO., 325 W. Court Street, Milwaukee 12, Wisconsin.



We offer complete, expert repair service on all makes, all types of instruments.

*Price subject to change without notice.

... for more details circle 271, page 16

ROADS AND STREETS, April, 1956

service for Cummins Illinois Engine Sales, Inc., Chicago, Ill., has been elected vice-president of the company. Cummins Illinois Engine Sales is the sales and service organization for the Cummins Engine Company, Inc., Columbus, Ind. Cummins Illinois serves the Chicago metropolitan area and parts of the states of Illinois, Iowa and Indiana.

ZIMMERMAN NEW HOUGH D. R. Ralph E. Zimmerman has been appointed district representative of sales district No. 5 by The Frank G. Hough Co., Libertyville, Ill. The district covers the states of New York and Pennsylvania (excluding New York City and Philadelphia area).

ADVERTISING MATERIAL FOR ARBA ROAD SHOWS. Harvey A. Scribner, Chairman of the Road Show Publicity Committee for the 1957 Convention and Road Show, announces that the committee now has available advertising material which manufacturers and dealers can use to aid in promoting the show. There are small cuts for use in manufacturers' and dealers advertising, stickers for use on letterheads and other mailing material, envelope stuffers and reprints. The committee would like very much to have manufacturers and dealers take part in the promotion of the show by using as much of this material as possible. It is free for the asking. Complete information

and samples can be secured from the American Road Builders' Association, World Center Bldg., Washington 6, D. C., or from the Publicity Committee, 155 North Wacker Drive, Chicago 6, Ill.

NEW MARION DISTRIBUTOR FOR VERMONT. State Equipment Co., Montpelier, Vt., has been appointed distributor for entire state of Vermont for Marion Power Shovel Co., Marion, Ohio. State Equipment will handle Marion's complete line of crawler and rubber excavators from $\frac{1}{2}$ cu. yd. to 4 cu. yd. capacity inclusive.

LESCHEN APPOINTS COURTRIGHT. Deane Courtright has been appointed district sales representative for Leschen Wire Rope Division, H. K. Porter Co., Inc., St. Louis, Mo. His territory includes the state of Washington, northern and western Idaho, and Montana.

NEW ATHEY DISTRICT REPRESENTATIVES. Charles T. Holmes has been appointed district representative in Southwest United States for Athey Products Corporation, 5631 West 65th St., Chicago, Ill. Mike Hunter has been appointed district representative in Northwestern United States.

NEW EUCLID DISTRIBUTOR FOR SASKATCHEWAN. Tobin Tractor Co., 655 Albert St., Regina, Sask., has been appointed authorized dealer for Province of Saskatchewan for Euclid Division, General Motors Corporation, Cleveland, Ohio.

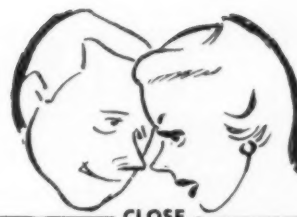
Damages for injunction

By Albert Woodruff Gray

In a suit by a property owner in Metairie, Louisiana, an injunction was asked and granted by the court, forbidding the continuance of work on the opening of a street by an adjoining property owner. This injunction was later set aside and the suit dismissed. The owner against whom the injunction had been granted then sued for damages, claiming he had lost \$2,004.51 in equipment rental payments and in grading and redressing this street. These damages were fixed by the lower court at \$1,704.57 and on appeal the Supreme Court reduced the amount to \$295.61.

"The undisputed evidence shows that this owner was damaged in the regrading and redressing of the street and the cost of the removal and return of the equipment to the site. The necessity for a redressing and regrading of the street was brought about by the temporary restraining order and this owner is certainly entitled to recover the cost of the same. For the reasons assigned the judgment of the lower court is amended so as to award this owner \$295.61."

C. N. Goldberg, Inc. v. Delerno, 73 So. 2d 464, Louisiana, May 31, 1954.



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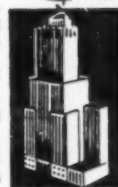
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11 meeting rooms accommodating 10 to 800 persons

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300 modern newly decorated sleeping rooms from \$4 single

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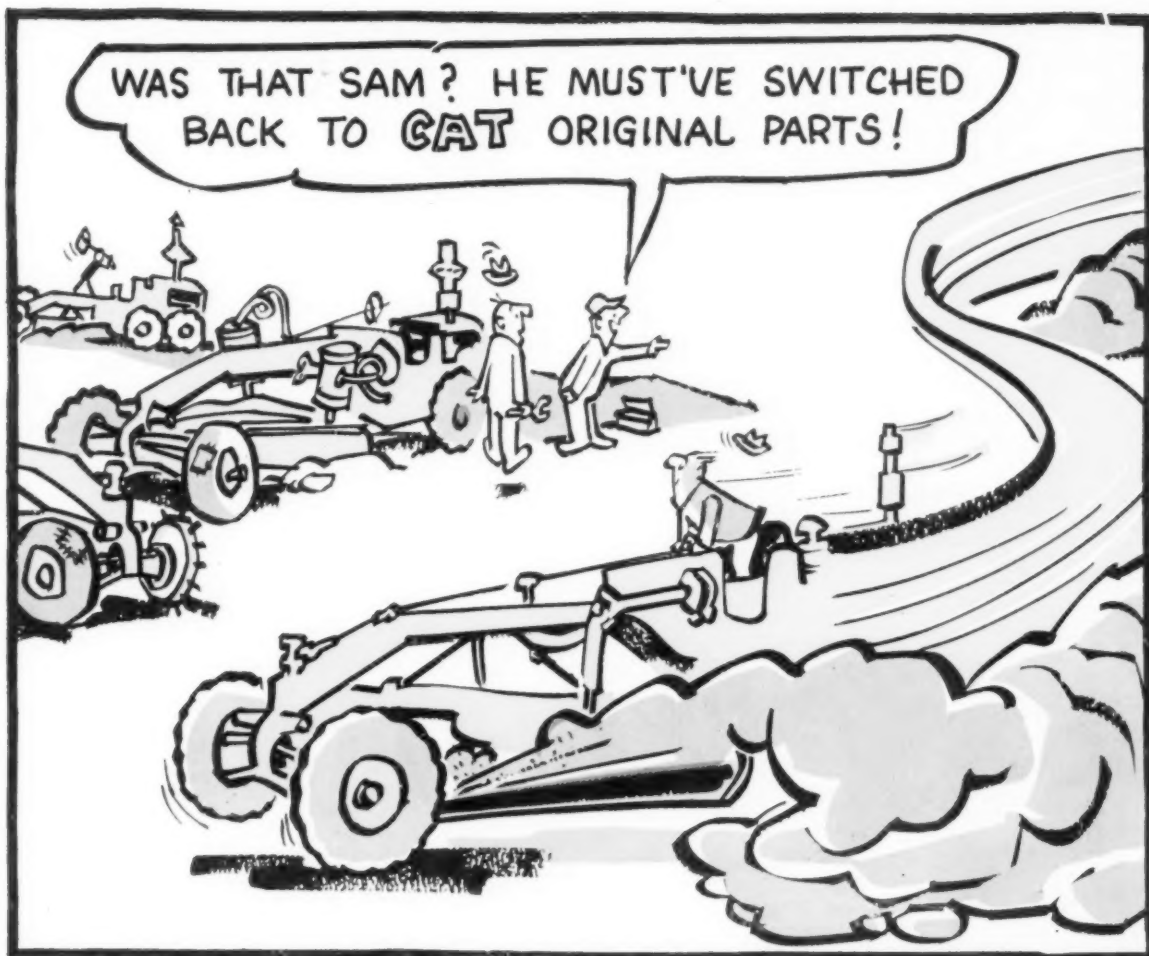
20 S. Dearborn St., Chicago



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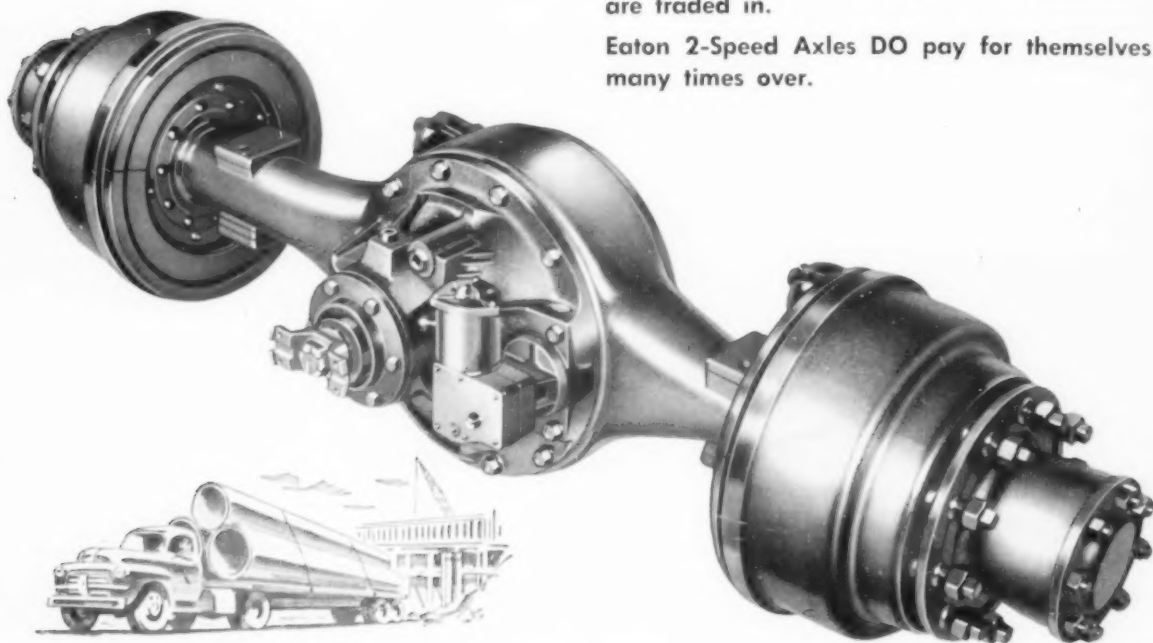


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